Industrial accidents, natural disasters and 'act of God'

INDUSTRIAL ACCIDENTS, NATURAL DISASTERS AND "ACT OF GOD"

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I. INTRODUCTION

Disasters befall developing and developed countries alike.[1] Scholars have long grappled with questions of how disasters can be prevented and governed, and how victims of disasters can be compensated.[2]

Traditionally, a distinction is made between technological disasters and natural disasters. This distinction is founded in logic; as tort law can easily be applied to man-made technological disasters because a tortfeasor can be identified and held liable. It is much more difficult to identify a tortfeasor responsible for natural disasters because they are said to be caused by *force majeure*, an "Act of God." Consequently, natural disasters are seemingly excluded from the realm of tort law.

However, this distinction between technological disasters and natural ones is not so simple. Nature may cause a disaster, but the scope of the damage can be exacerbated by human mistakes. For example, constructing residences in a flood plain or failing to take preventive measures to minimize the harm caused by natural disasters largely increases the magnitude of the resulting damage. Preventive measures like structurally changing river shapes to provide additional buffer basin to mitigate flooding damage and employing building techniques to reduce the impact of an earthquake on dwellings[3] highlight that governments, not individuals, have the capacity to take these overarching preventive measures.[4] Consequently, liability for the consequences of a natural disaster may be imposed on the government.

The increased occurrence and magnitude of natural disasters caused by climate change exemplify the point that man's actions play a role in causing

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[1] The losses due to disasters have increased considerably over the last decades. *See, e.g.*, Laurens M. Bouwer, *Have Disaster Losses Increased Due to Anthropogenic Climate Change?*, 92 BULL. AM. METEOR. SOC'Y 39, 43 (2011) (discussing increased economic losses resulting from climate change-influenced disasters).

[2] *See, e.g.*, VÉRONIQUE BRUGGEMAN, COMPENSATING CATASTROPHE VICTIMS: A COMPARATIVE LAW AND ECONOMICS APPROACH (2010); *see also* FINANCIAL COMPENSATION FOR VICTIMS OF CATASTROPHES: A COMPARATIVE LAW AND ECONOMICS APPROACH (Michael Faure & Ton Harlief eds., 2006); *see generally* ON RISK AND DISASTER: LESSONS FROM HURRICANE KATRINA (Ronald J. Daniels, Donald F. Kettle & Howard Kunreuther eds., 2006).

[3] *See, e.g.*, T. Imai, *Earthquake Insurance on Dwelling Risks in Japan*, *in* ASIAN CATASTROPHE INSURANCE 59–77 (C.H. Scawthorn & K. Kobayashi eds., 2008).

[4] *See* Michael Faure, *Towards Effective Compensation for Victims of Natural Catastrophes in Developing Countries*, *in* REGULATING DISASTERS, CLIMATE CHANGE AND ENVIRONMENTAL HARM: LESSONS FROM THE INDONESIAN EXPERIENCE 243–45 (Michael Faure & Andri Wibisana eds., 2013).

the resulting damage.[5] Even though liability rules in climate change cases cannot be neatly applied, scholars increasingly debate and consider the possibility of imposing such liability.[6]

This Article will focus on distributing liability for industrial accidents triggered by natural disasters like the incident at Japan's Fukushima nuclear reactor, which resulted from a March 11, 2011 tsunami. While natural disasters are generally excluded from tort liability, excluding industrial operators from liability altogether when an industrial accident was triggered by a natural disaster may be too easy of a solution if the damage could have been mitigated by preventive measures that were not taken. The Fukushima case is illustrative in this respect. There, the nuclear reactor meltdown occurred primarily because both the original and the reserve generators for the cooling system were placed at a low level in the nuclear power plant which was located in an area vulnerable to earthquakes and tsunamis. Consequently, the nuclear reactors were vulnerable to flooding.[7] Should the entity responsible for the power plant's faulty design and operation be excluded from liability simply because a *force majeure* triggered the natural disaster?

We will address this question by first providing a few theoretical observations based on economic analysis of the deterrent function of liability rules. Next, we will discuss United States case law concerning natural disasters, *force majeure*, and the way natural disasters and *force majeure* are treated in cases involving nuclear accidents. We will then examine two exemplary Asian cases: the Indonesian mudflow highlighting the difficulties in distinguishing between technological and natural disasters, and Fukushima highlighting how technological flaws and natural disasters together caused the damage.

II. THEORETICAL BACKGROUND

The economic analysis of accident law is helpful in assessing whether liability should stem from an industrial accident caused by a natural disaster

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[5] *See* Richard Zeckhauser, *The Economics of Catastrophes*, 12 J. RISK UNCERTAINTY 134 (1996).

[6] See on this issue *inter alia* the contributions in CLIMATE CHANGE LIABILITY (Michael Faure & Marjan Peeters eds., 2011).

[7] *See* J. Mark Ramseyer, *Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan*, 13 THEORETICAL INQUIRIES IN LAW 457 (2011); *see also* Michael Faure & Jing Liu, *The Tsunami of March 2011 and the Subsequent Nuclear Incident at Fukushima: Who Compensates the Victims*, 37 WM. & MARY ENVTL. L. & POL'Y REV. 129, 202–03 (2012).

because it posits that liability exposure will provide operators incentives to take preventive measures.[8] Potential liability would cause operators to weigh cost and benefits and ultimately adopt optimal care and activity levels.[9]

A. Act of God and Efficient Liability Rules

The Latin maxim *actus dei nemini facit injuriam* stands for the common principle that the law should hold no man responsible for the Act of God.[10] The law and economics scholarship generally supports this principle. For example, Landes and Posner argue that holding one liable for the damage resulting from an Act of God will not result in allocative gains, since liability cannot deter a similar damage in the future.[11] Standard tort law economic analysis considers the goal of tort law to be minimizing the expected social costs of accident $E(SC)$, where $E(SC)$ is the sum of cost of care, wx, plus the expected harm which depends on the level of care, $p(x)A$. Following Cooter and Ulen, the expected social costs of an accident is denoted as:[12]

$$E(SC) = wx + p(x)A \ldots ((1))$$

The optimal level of care, x^*, is a level of care that minimizes the expected costs of accident, $E(SC)$. Where the level of care is optimal, the marginal cost of care will equal the reduction of expected harm, that is:

$$w = -p^1(x^*)A \ldots ((2))$$

It follows from (1) and (2) that both the negligence rule and strict liability will induce the injurer to take the optimal level of care. Under the negligence rule, the injurer will choose x^* since, by taking this level of care, she will avoid being held liable for the harm, A. Under strict liability, the injurer will take x^* since this level of care will result in the least expected costs of accident $E(SC)$.[13]

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[8] This has been developed by Steven Shavell among others. *See, e.g.*, STEVEN SHAVELL, ECONOMIC ANALYSIS OF ACCIDENT LAW 297–98 (1987).

[9] Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL STUD. 1 (1980).

[10] C.G. Hall, *An Unsearchable Providence: The Lawyer's Concept of Act of God*, 13 OXFORD J. LEGAL STUD. 227, 229 (1993).

[11] William M. Landes & Richard A. Posner, *Causation in Tort Law: An Economic Approach*, 12 J. LEGAL STUD. 109, 117 (1983).

[12] ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 200–01 (6th ed. 2012).

[13] *Id.* at 203–07.

Although both the negligence rule and strict liability can induce the injurer to take the optimal level of care, they are different in their impacts on the optimal level of activity. Since under the negligence rule the injurer will not be liable so long as he takes the optimal level of care, he will not have incentives to reduce his activity level up to the optimal level (or to take the optimal level of activity). In contrast, since strict liability will hold the injurer liable anytime the damage occurs, the injurer will also take the optimal level of activity in order to reduce the chance of accident and being held liable.[14]

The presence of a possible Act of God changes (1). When the court accepts the defense of an Act of God, the probability of an accident depends solely on the Act of God, and does not depend on the injurer's negligence. Hence, this situation basically shows that the change in the probability of accident with respect to the change in the injurer's level of care is zero.[15]

Since the marginal cost of care equals the reduction of expected harm resulting from the change in the injurer's level of care, one could conclude that holding the injurer liable for an accident arising from his negligence is enough to induce him to take the optimal level of care.[16] In this situation, as long as the cost of taking the optimal level of care is less than the expected liability, the injurer will be induced to take the optimal level of care in order to avoid liability.

In addition, it could also be concluded that similar incentives to take the optimal level of care will also apply under strict liability. When the defense of an Act of God is accepted, the injurer will be liable for the damage resulting only from his activity. Thus, he will take the optimal level of care, since this is the level that minimizes total expected costs.

B. Act of God and the Scope of Liability

The question arises, of course, whether and under what conditions the court will accept the Act of God defense, and hence interpret that the change in the probability of accident with respect to the change in the injurer's level of care is zero. Such a question corresponds to the issue of what has been termed as the scope of liability. Ben-Shahar considers the scope of liability as a causation restriction, consisting of a set of circumstances where liability

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[14] *Id.* at 212.
[15] *See* Landes & Posner, *supra* note 11, at 114.
[16] *Id.*

applies. Accordingly, the scope of liability determines that an injurer is liable when his level of care is a necessary cause of harm; his level of care is a necessary cause if a different level of care would have led to another level of harm. The scope of liability is considered restricted if there are circumstances under which the injurer is not liable despite the presence of some harms. In contrast, the scope of liability is unrestricted if the injurer will always be liable any time harm occurs, regardless of the circumstances surrounding the harm.[17]

It is likely that the scope of liability is set at the optimal level, whereby the injurer is liable only for the harm arising from his act (or his lack of care under the negligence rule). Under an optimal scope of liability, the injurer is not liable for harm that was not caused by his act, namely when the change of injurer's care did not alter the probability of harm. However, it is likely that the scope of liability is inefficiently unrestricted such that the injurer is held liable although his level of care did not alter the probability of harm. In contrast, it is also likely that the injurer is not liable although his act did change the expected harm. This is a situation of an inefficiently restricted scope of liability, where the injurer is not held liable although the change in the injurer's level of care might also contribute to the accident given the presence of an Act of God.

Law and economics scholarship indicates that these sets of liability scope each give rise to different incentives for the injurer to take the optimal levels of care and activity. For example, under the negligence rule, the unrestricted scope of liability might lead to increased administrative costs associated with the use of lawsuits, but the injurer will still be induced to take the optimal level of care. In this case, "imposing liability for negligence where care would not have avoided the accident could produce an inefficient reduction in the injurer's activity level."[18] However, if the scope of liability is too

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[17] Omri Ben-Shahar, *Causation and Foreseeability*, *in* ENCYCLOPEDIA OF LAW AND ECON. 644, 644–49 (Boudewijn Bouckaert & Gerrit De Geest eds., 2000) [hereinafter Ben-Shahar, *Causation and Foreseeability*, 2000]. *See also* Omri Ben-Shahar, *Causation and Foreseeability*, *in* TORT LAW AND ECONOMICS 83, 87 (Michael Faure ed., 2009) [hereinafter Ben-Shahar, *Causation and Foreseeability*, 2009]. According to Shavell, the scope of liability can be restricted by following the "cause-in-fact" principle, i.e., the test indicating that harm would not have occurred but for the injurer's act. In addition, the scope of liability can also be restricted for some other grounds, e.g., that the injurer's act was not the "proximate cause" of the harm, that after the injurer's act there was an "unforeseeable intervening cause," or that the harm was a freak occurrence. *See* Steven Shavell, *An Analysis of Causation and the Scope of Liability in the Law of Torts*, 9 J. LEGAL STUD. 463, 463–64 (1980). Landes & Posner, *supra* note 11, at 118.

[18] Landes & Posner, *supra* note 11, at 118.

restricted, the injurer will not have incentives to take the optimal level of care or to reduce his level of activity.[19]

Under strict liability, an unrestricted scope of liability will induce the injurer to take the optimal level of care as he can be held liable for any harm. In addition, since he will be liable for any harm, the injurer will significantly reduce the level of activity and will perhaps withdraw from activity. If the injurer's engagement in his activity is socially desirable, strict liability presents a serious problem. People may withdraw from socially beneficial activities in order to avoid liability. Such an unfortunate situation, resulting from what is called by Shavell as "crushing liability,"[20] is to be avoided by restricting liability. The problem is, however, inefficiently restricting the scope of liability will lessen the incentives to take the optimal level of care meaning fewer incentives to take care in preventing harm.[21]

The above discussions on the scope of liability are crucial for the analysis of the Act of God defense. Defined too broadly, the use of the Act of God defense significantly limits the scope of liability and the injurer might have fewer incentives to take the optimal level of care. Defined too narrowly, the defense may inefficiently broaden the scope of liability, which could eventually lead to a less than optimal level of activity. But this disadvantage may be outweighed by the advantages.

C. Foreseeability and Uncertainty Over Causation

An Act of God could be seen as an unforeseeable factor which intervenes in the injurer's act. In this regard, the injurer should not be held liable for harm resulting from an event that is considered unlikely to occur. Indeed, one cannot be required to prevent a harm of which the probability is zero. Hence, liability for this type of harm will not induce the injurer to take optimal precaution ex ante.

An important question in determining whether an event is unforeseeable is which type of probability should be taken into account. Shavell defines unforeseeability as an event of which the probability has been underestimated by the injurer. In this regard, Shavell argues that the inclusion of an accident overlooked by the injurer in the scope of liability will not have any effect on the injurer's behavior since this behavior will be

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[19] Shavell, *supra* note 17, at 487–88.
[20] *Id.* at 465.
[21] *Id.* at 484.

dependent on the injurer's subjective probability.[22] However, as Shavell also indicates, the foreseeability test for liability might reduce the incentives for the injurer to carefully take into account the potential impacts of his action.[23]

One could also find that employing subjective probability in determining the unforeseeability might lead to a situation where the injurer's subjective probability is systematically lower than that of the court or a reasonable man. In this situation, the injurer may potentially argue that he could not have foreseen the occurring harm, although similar harm had once occurred or it was within the risks of the injurer's activity. If the injurer is allowed to use such an argument in order to establish the unforeseeability of harm, one could expect that this will significantly reduce the injurer's incentive to anticipate and prevent the harm that, in the court's opinion, should have been foreseen.

Finally, the Act of God defense might also correspond to the issue of uncertainty over causation. In this regard, two familiar approaches in addressing the uncertainty are the all-or-nothing and the proportional liability approaches. Under the all-or-nothing approach, the injurer will be held liable for all harm once it is established that the probability that the injurer's act caused the harm exceeds the probability threshold, usually the preponderance of the evidence rule.[24] In contrast, under the proportional liability approach, the injurer's liability is proportional to the probability that his act is the cause of the harm.[25] Shavell argues that the proportional liability approach is superior to the all-or-nothing approach because proportional liability induces the injurer to take both socially optimal levels of care and activity if strict liability is applied and leads to the optimal level of care if the negligence rule is applied. These results do not hold for the all-or-nothing approach.[26] The issue of uncertainty over causation is of high importance in determining

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[22] *Id.* at 490. Shavell also describes some findings in behavioral economics indicating that people tend to underestimate the probability of an event that is hard to imagine or not memorable. *Id.* at 491.

[23] *Id.* at 492. Similarly, Ben-Shahar argues that including unforeseen harms in the scope of liability might have the positive impact of inducing the injurer to find out information about the consequences of this action. *See* Ben-Shahar, *Cause and Foreseeability*, 2009, *supra* note 17, at 101.

[24] Neil Orloff & Jery Stedinger, *A Framework for Evaluating the Preponderance-of-the-Evidence Standard*, 131 U. PA. L. REV. 1159 (1983).

[25] Ben-Shahar, *Causation and Foreseeability*, 2000, *supra* note 17, at 652–53.

[26] Steven Shavell, *Uncertainty over Causation and the Determination of Civil Liability*, 28 J.L. & ECON. 587, 596–99 (1985).

liability where an Act of God comingled with the injurer's act resulted in the victim's harm.

D. Summary

The above overview highlights the fact that there is no easy, straightforward answer as to how the Act of God defense should be treated, especially when it is triggering an industrial accident. The Act of God is not in the injurer's scope of control, but the industrial accident may be within the injurer's scope of control. The difficulty in determining the proper scope of liability in such a case lies in determining what it means that the natural disaster "caused" the industrial accident. The crucial question then becomes: Notwithstanding the Act of God (like a natural disaster), could the operator have taken efficient measures either to prevent the occurrence of the incident or limit the scope of the harm? If the answer to the question is yes, excluding liability of the operator simply because the incident was related to an Act of God would clearly be inefficient. From this, other pertinent questions arise, such as whether a natural disaster is unforeseeable or within the scope of causal uncertainty, and to what extent the harm was caused by the natural disaster itself, the operator's negligence, or both.

Notwithstanding the nuances of the presented economic analysis, it is clear that exposing an operator to liability for harm which he could not reasonably have prevented (since the event was caused by a natural disaster–an Act of God) would clearly be inefficient. Such liability exposure would not increase prevention incentives because the event would be totally unforeseeable. Exposure to liability would only deter economic efficient activity. However, excluding liability of the operator just because the event was triggered by a natural disaster would lead to under deterrence to the extent that the operator could have foreseen the natural disaster (e.g., because his facility was built in an earthquake or flood prone area) and could thus have taken efficient preventive measures to reduce the probability of the incident occurring or the magnitude of the harm. Therefore, determining to what extent the industrial incident triggered by a natural disaster was foreseeable and to what extent the harm could have been prevented is crucial. If the operator could foresee the natural disaster and the lack of preventative measures by the operator caused the accident, imposing liability is reasonable. If, however, the operator's negligence in not taking sufficient preventive measures only contributed to the probability of the accident or to an increase in the magnitude of the harm, then magnitude of this proportion

should be assessed. In that case, like with uncertainty over causation, a proportional liability approach could be applied.

The extent to which it is merely the natural disaster, the operator's failure to foresee the disaster and take appropriate preventive measures, or a combination of both is of course a factual and technical matter. Therefore, we will now turn to the case law in the United States, showing how courts have dealt with these questions.

III. ACT OF GOD IN U.S. LAW

In cases involving a natural cause defenses, all courts are faced with difficulties in deciding the case amidst scientific and technical debates concerning the true causes of harm. Unfortunately, some courts may also have difficulties finding accepted authority regarding the use of natural cause as a defense. In Indonesia, for example, there are no Indonesian textbooks or scientific articles on tort law that specifically discuss the meaning of a natural cause from a legal perspective. This is, however, not the case in the United States. There are various discussions on the natural cause, or Act of God, defense.[27]

Rulings of U.S. courts show the application of principled rules usually requires the party invoking the Act of God defense to prove some elements of the defense. These elements will be discussed below.

In defining an Act of God, some U.S. courts have emphasized the exceptional character of a disaster in being unpreventable and unavoidable. For example, in *Apex Oil Company, Inc. v. United States* the court defined an Act of God as "unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character the effects of which could not have been prevented or avoided by the exercise of due care or foresight."[28] The court referred to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), stating that whether or not the Act of God defense will be accepted depends

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[27] In fact, one can find an article on the use of the Act of God defense, which was published as early as 1883. In that article, Murfree, Sr. contrasts the Act of God with that of humans. The author argues that the Act of God is "something in opposition to the act of man; for everything is the Act of God that happens by His permission; everything by His knowledge." W.L. Murfree, Sr., *The Act of God*, 16 CENT. L.J. 182, 182 (1883). The author also notes that in the case invoking the Act of God defense, the defendant bears the burden to prove not only that the damage was caused by an Act of God, but also that there was no possibility to prevent the loss, and no defendants' negligence contributed to the realization of the loss. *Id.* at 184.

[28] 208 F. Supp. 2d 642, 645 (E.D. La. 2002).

on the evidence of whether the disaster is exceptional, inevitable, and irresistible in nature.[29]

Other rulings emphasize the absence of human intervention and reasonable capacity to foresee or prevent the disaster. In *Joseph Resnick, Co. v. Kaisha*, the court referred to the definition of the natural disaster given by *Black's Law Dictionary*, which defines a natural disaster as:

> Any misadventure or casualty is said to be caused by the "Act of God" when it happens by the direct, immediate, and exclusive operation of the forces of nature, uncontrolled or uninfluenced by the power of man and without human intervention, and is of such a character that it could not have been prevented or escaped from by any amount of foresight or prudence, or by any reasonable degree of care or diligence, or by the aid of any appliances which the situation of the party might reasonably require him to use.[30]

Another definition of a natural disaster is given by the Pennsylvania Supreme Court in *Carlson v. Corrugated Box Corp.* In this case, the court interpreted a natural disaster as "an unusual, extraordinary, sudden, and unexpected manifestation of the forces of nature which cannot be prevented by human care, skill or foresight."[31]

Finally, the Kansas Supreme Court in *McFeeters v. Renollet* formulated a natural disaster as "an irresistible superhuman cause such as no reasonable human foresight, prudence, diligence and care can anticipate and prevent;

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[29] The court stated that:

> The defense for the exceptional natural phenomenon is similar to, but more limited in scope than, the traditional 'Act of God' defense. It has three elements: the natural phenomenon must be exceptional, inevitable, and irresistible. Proof of all three elements is required for successful assertion of the defense. The 'Act of God' defense is more nebulous, and many occurrences asserted as 'acts of God' would not qualify as 'exceptional natural phenomenon.'

For example, a major hurricane may be an Act of God, but in an area (and at a time) where a hurricane should not be unexpected, it would not qualify as a "phenomenon of exceptional character." *Id.* at 653.

[30] 241 N.Y.S.2d 134, 136. A similar definition can also be found in other rulings, such as *Butts v. City of South Fulton*, 565 S.W.2d 879 (Tenn. Ct. App. 1977); *McWilliams v. Masterson*, 112 S.W.3d 314 (Tex. App. 2003); *Sky Aviation Corp. v. Colt*, 475 P.2d 301 (Wyo. 1970); and *Utilities Pipeline Co. v. Am. Petrofina Mktg.*, 760 S.W.2d 719 (Tex. App. 1988).

[31] 72 A.2d 290, 291 (Pa. 1950).

and to be a defense must be an intervening cause which was not foreseeable and the consequences of which could not be prevented."[32]

Based on the definitions above, in order to be qualified as a defense to escape liability, an Act of God should meet the requirements of being grave, unforeseeable, and free from human intervention.[33] These requirements will be elaborated in the following sections.

A. Elements of an Act of God

1. An Act of God Should Be Grave

Generally, courts require an Act of God to be grave or severe in magnitude. This held true in *Sabine Towing & Transportation Co. v. United States*, where the party invoking the defense was required to demonstrate that the Act of God was of great magnitude.[34] The court, in rejecting the

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[32] 500 P.2d 47, 48 (Kan. 1972).

[33] One must note that other commentators might observe more or less requirements in examining the Act of God defense. For example, Rundall has proposed a two-tier test for the Act of God defense. In the first tier, the defendant must prove that an event claimed as an Act of God can indeed be qualified as an Act of God. Once the act is qualified as an Act of God, the second test takes place. In this test, the defendant has the burden to prove that the Act of God is the sole proximate cause of the plaintiff's loss. *See* Marsha T. Rundall, *"Act of God" as a Defense in Negligence Cases*, 25 DRAKE L. REV. 754, 761–62 (1976). However, it could also be argued that the first tier test is indeed the test to show that the claimed Act of God is both grave in magnitude and unforeseeable. Other commentators even observe four requirements in examining the Act of God defense, namely: first, that the event was a grave natural phenomenon of an exceptional, inevitable, and irresistible character; second, whether the event was anticipated; third, whether the event was the sole cause; and fourth, whether the consequences of the event could have been prevented by due care or foresight. *See* Joel Eagle, *Divine Intervention: Re-Examining the "Act of God" Defense in a Post-Katrina World*, 82 CHI.-KENT. L. REV. 459, 476–87 (2007); *see also* Casey P. Kaplan, *The Act of God Defense: Why Hurricane Katrina and Noah's Flood Don't Qualify*, 26 REV. LITIG. 155, 175–76 (2007). It should be noted here that the examination of whether the claimed Act of God is unforeseeable also includes the discussion about the foreseeability of its consequences, and, hence, also includes the fourth requirement under the four requirements above.

[34] Ralph M. Sugg, *Blame It on the Rain? El Niño is No Excuse to Pollute*, 21 WHITTIER L. REV. 737, 752 (2000). In *Sabine Towing & Transp., Co. v. United States*, the Sabine Towing filed a lawsuit against the U.S. Government. The plaintiff challenged the Government decision requiring the plaintiff to conduct a cleanup for oil spills from the plaintiff's vessel which ruptured after striking unknown objects in the Hudson River. When the vessel was moving in the Hudson River, there was a freshet condition in the River, as a result of spring runoff of melted snow, which apparently not only increased the level of the River, but also brought sediment, gravel, logs, rocks and other debris. The vessel inadvertently hit unknown objects in the River, which then ruptured the vessel's hull and tank. The cleaning cost the

plaintiff's Act of God defense, declined to categorize both spring runoff of melted snow and the unknown objects that ruptured the ship's hull as a natural disaster.[35] Eagle observes that the key to passing the test of gravity for an Act of God defense is to show that an event was not only much more grave and exceptional compared to other past Act of God cases, but one of the most exceptional character.[36] In this regard, one may see that the element of gravity could be seen only in comparison with other similar events, in which the claimed Act of God must be exceptional compared to other Act of God events. The California Supreme Court in *Southern Pac. Co. v. City of Los Angeles* confirmed this position by refusing to qualify rainstorms as a defense. According to the Court, rainfall with the above-normal intensity was not a natural disaster within the context of the Act of God defense. The court stated "that a rainstorm which is merely of unusual intensity is not a 'superhuman' cause or Act of God, superseding the original negligence as the proximate cause of the injury."[37] This opinion is also expressed in *United States v. Stringfellow*,[38] where the court ruled that "rains were not the kind of 'exceptional' natural phenomena to which the narrow Act of God defense of section 107(b)(1) applies."[39] The importance of these rulings is that the courts usually associate a natural event with the time and place where the event took place, such that if the event was common to that particular time and place, the courts would refuse to consider the event as unanticipated, and would hence, refuse the Act of God defense.

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plaintiff incurred $113,943.41. Sabine Towing & Transp., Co. v. United States, 666 F.2d 561, 562–63 (Ct. Cl. 1981).

[35] *Sabine Towing & Transp., Co.*, 666 F.2d at 565.

[36] Eagle, *supra* note 33, at 479.

[37] 55 P.2d 847, 849 (Cal. 1936).

[38] 661 F. Supp. 1053 (C.D. Cal. 1987). In this case, the plaintiff, the U.S. Government and the Government of California, asked the defendants, namely a company producing, treating, and transporting hazardous wastes, to reimburse the cost incurred by the plaintiff to conduct clean-up and recovery from hazardous waste pollution. The defendants argued that the pollution occurred due to heavy rains.

[39] *Id.* at 1061; *see also* Radburn v. Fir Tree Lumber, Co., 145 P. 632, 633 (Wash. 1915) (rejecting an Act of God defense based on heavy rainfalls that apparently exceeded the Government's official record of rainfall in the past thirteen years). With respect to the record of heavy rains, the North Dakota Supreme Court in *Frank v. County of Mercer* considered as an Act of God a rainfall of more than twice the maximum that would be expected to occur once in a hundred years a natural disaster. The rainfall of this level is considered so unprecedented and extraordinary that it fell within the Act of God defense. 186 N.W.2d 439 (N.D. 1971).

It should also be noted here that a large number of court rulings explain the grave and exceptional characters of a natural disaster by referring to the question of whether the natural event was so unprecedented, unforeseeable, and unanticipated, that it was unpreventable or unavoidable. Therefore, the actual discussion about the gravity of a natural disaster will eventually correspond to the ability to foresee the occurrence of a natural disaster, and accordingly, to prevent the disaster or to minimize the impacts if it nevertheless occurs. In this way, although one might have satisfied the courts in showing that the claimed Act of God event was grave, one still has to show that the event was unforeseeable.

2. The Act of God and Its Impacts Should be Unforeseeable

The second element of an Act of God, i.e., the element of unforeseeablity, was used by a South Carolina court to define an Act of God as an accident resulting from natural causes, impossible to be foreseen, and therefore impossible to be guarded against.[40]

Unforeseeability is usually established by showing that the event is unprecedented in a particular area.[41] Some courts interpret the term "unprecedented" in such a way that if a similar event has occurred any time before the particular event, the event will be considered foreseeable, and hence, the Act of God defense will fail to past the test.[42] Other courts conclude that to qualify as an Act of God in a legal sense, an event must not only be unusual, but also be so unprecedented that its impacts could not be anticipated nor prevented.[43]

When appraising the element of unforeseeability, courts usually pay a great deal of attention to the characteristics of time and place. In *Sky Aviation Corp. v. Colt*, the Wyoming Supreme Court rejected categorizing wind as a natural disaster reasoning that "[t]he ordinary force of nature such as winds which are usual at the time and place are conditions which reasonably could have been anticipated and will not relieve from liability the person guilty of the original negligent act."[44] One commentator concludes that in seeing whether an event could have been anticipated or not, courts

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[40] Bill B. Bozeman, Note, *Act of God*, 4 S.C. L. Q. 421, 421 (1951).

[41] James Lewis Howe III, *Act of God: A Reconsideration*, 18 WASH. & LEE L. REV. 336, 337 (1961).

[42] *Id.*

[43] *Id.* at 339.

[44] 475 P.2d 301, 304 (Wyo. 1970).

will take into account the character of the area, the surrounding circumstances, and the history of previous similar events in the area where the event took place.[45]

Courts will also assess whether similar natural events have occurred prior to the event in question in examining unforeseeability in an Act of God. Hence, a natural event could be qualified as an Act of God if it was unprecedented. In *State v. Malone*, the Texas Court of Appeals explicitly made a distinction between the definition of unprecedented on the one hand, and the definition of unusual or extraordinary on the other hand. In this case, the court held that the term "unprecedented" means there is no previous example or a new incident, while the term "unusual" or "extraordinary" implies that a similar event has occurred, although rarely or infrequently.[46]

More importantly, a court might also be of the opinion that a natural disaster, which has occurred in the past, should be seen as something that could recur in the future. In this way, the disaster is considered foreseeable, despite the fact that it might be extraordinary in nature. In this context, the Nebraska Supreme Court, in *Fairbury Brick, Co. v. Chicago, R.I. & P. Ry. Co.*, stressed that:

> The mere fact that a flood is extraordinary is not sufficient to absolve the defendant from liability. Although a rainfall may be more than ordinary, yet if it be such as has occasionally occurred at irregular intervals, it is to be foreseen that it may occur again; and a party engaged in a public work, the construction of which involves the change or restraint of the flow of water in a natural channel, is guilty of negligence if it fails to make reasonable provision for the consequences that will result from such extraordinary rainfalls as experience shows are likely to recur.[47]

Furthermore, in examining whether a natural event could be considered unprecedented, some courts look into the ability to anticipate or foresee the

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[45] Rundall, *supra* note 33, at 755.

[46] The court stated: " 'Unprecedented' means 'having no precedent or example; novel, new, unexampled' " while the terms " 'Unusual' and 'extraordinary' . . . presuppose other like occurrences, though rare or infrequent." State v. Malone, 168 S.W.2d 292, 300 (Tex. Civ. App. 1943).

[47] 113 N.W. 535, 537 (Neb. 1907); *see* Webb v. Platte Valley Pub. Power & Irrigation Dist., 18 N.W.2d 563, 568 (Neb. 1945); State v. Malone, 168 S.W.2d 292, 300 (Tex. Civ. App. 1943).

natural phenomenon and to avoid the resulting impacts. In this regard, the Missouri Supreme Court, in *Kennedy v. Union Electric, Co. of Missouri*, held that "[t]he term 'Act of God', in its legal sense, applies only to events in nature so extraordinary that the history of climatic variations and other conditions in the particular locality afford no reasonable warning of them."[48] Accordingly, one might conclude that information on local conditions and past records of natural disaster should enable the parties to anticipate the recurrence of the disaster. Therefore, a natural disaster that has occurred in the past or is considered common should be seen as a foreseeable disaster, no matter how large the impact might be. If the court thinks that such a natural event is foreseeable, in the terms of its occurrence and possible impacts, the Act of God defense is very likely to be dismissed. The California Supreme Court in *Southern Pac. Co. v. City of Los Angeles*, clearly expressed this position when it stated:

> There is nothing in the nature of the rainstorm involved in this case which makes it so totally unforeseeable as to act as a superseding cause. It was simply a heavy rain, commencing and continuing for several days, and perhaps it established a record for volume in inches in that region. But it cannot be concluded from this fact that the cause was wholly unforeseeable. Rainfall is foreseeable in most places, and heavy rainfall was characteristic of that region. There is no point at which an expectable heavy rain becomes an act of God by reason of its unusual volume.[49]

The rules concerning the Act of God defense can be categorized as the rules regarding intervening causes.[50] To qualify as an Act of God in a legal sense, an event should be an unforeseeable intervening cause of which consequences could not be prevented. In this regard, the defendant is liable for both foreseeable results of foreseeable causes and for foreseeable results of unforeseeable causes.[51]

It is important to note that the test of unforeseeability is carried out by referring to objective standards, in the sense that the defendant should be

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[48] 216 S.W.2d 756, 763 (Mo. 1948).

[49] 55 P.2d 847, 849 (Cal. 1936).

[50] Denis Binder, *Act of God? Or Act of Man?: A Reappraisal of the Act of God Defense in Tort Law*, 15 REV. LITIG. 1, 27 (1996).

[51] *Id.*

able to show that the event and its consequences cannot be foreseen, anticipated, or prevented by a reasonable person. In this regard, Binder argues that the test is about "what a reasonable person under similar circumstances knew, or reasonably should have known," and not about "what a defendant thought."[52] In this sense, if an abnormal situation is foreseeable, then taking normal precaution is not enough to prove that a defendant has taken preventive measures to avoid the natural event and its consequences.[53] In *Phillips v. United States*, the court held that the unforeseeability concept is flexible: If the danger is high and prevention relatively simple, the level of foreseeability is considered high; whereas if the level of danger is low and the prevention is considered difficult, the level of foreseeability is considered low.[54] In other words, it can be argued that when the danger is seen to be high and the prevention is simple, everyone should increasingly be able to predict the danger and to take the necessary preventive measures. The court further stated that foreseeability is determined not only on the grounds of whether a future harm is more probable than not, but also "whatever result is likely enough in the setting of modern life that a reasonable prudent person would take such into account in guiding reasonable conduct."[55]

It should be noted here that the majority of cases observed by commentators somehow correspond only to certain types of natural events, namely heavy rains, storms, hurricane, floods, or heavy snow. None of these cases actually correspond to earthquakes. Thus, it may appear that certain natural events, such as an earthquake, are still qualified as natural events that can be used as an Act of God defense. This is indeed the case in *Slater v. S. Carolina Ry. Co.*, in which the court clearly upheld the defendant's claim bringing up an earthquake as a defense to escape liability.[56]

However, one might also argue here that similar to other natural phenomena, not all types of earthquake should be accepted as an Act of God.

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[52] *Id.* at 17.

[53] *Id.* at 16–17.

[54] 801 F. Supp. 337, 345–46 (D. Idaho 1992).

[55] *Id.* at 346. This might simply mean that in assessing the level of foreseeability of an event, one should look at possible future consequences of the event on the basis of modern life (e.g., according to the development of science and technology), and then take these effects into account in one's decision.

[56] 6 S.E. 936 (S.C. 1888). It should, nevertheless, be noted here that the court also stated that the defendant's Act of God defense was accepted by the court because the defense was not challenged by the plaintiff and its witness. *Id.* at 937.

In this regard, only if it was extraordinary, unforeseeable, and unanticipated, will an earthquake be qualified as a defense to escape liability.[57]

In addition, it is also important to bear in mind that the assessment of whether an earthquake could be qualified as an Act of God will depend not only on the exceptional character of the earthquake, but also on the ability of existing science and technology to foresee, and hence, to inform the parties to take the necessary anticipatory measures. In this regard, one may refer to the ruling in *Butts v. City of South Fulton*, where the court defined a natural disaster as a natural phenomenon "of such character that it could not have been prevented or escaped from by any amount of foresight or prudence, or *by the aid of any appliances which the situation of the party might reasonably require him to use*."[58] The ruling indicates that courts will pay attention to the question of whether those who invoke the defense have previously applied appropriate measures, methods, or technology to prevent the disaster or its possible impacts. Taking into account the rapid development of science and technology, an earthquake might, to some extent, still be reasonably considered foreseeable, anticipated, and preventable. Accordingly, an earthquake should increasingly be more difficult to meet the requirement to be qualified as a reason to escape liability in the context of the Act of God defense.

For this reason, Flatt and Kliner argue "[g]iven the current state-of-the-art knowledge of earthquake hazard assessment, in addition to the ability to provide earthquake resistant structures at a relatively nominal increase in cost, the Act of God defense should not be viable."[59] As such, current scientific understanding is relatively able to predict the possibility of an earthquake occurring in an active fault zone within a certain period of time and are thus foreseeable.[60] With advanced science and technology, it

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[57] Shea-S&M Ball v. Massman-Kiewit-Early, 606 F.2d 1245, 1249 (D.C. Cir. 1979); Fairbury Brick, Co. v. Chicago R.I. & P. Ry. Co., 113 N.W. 535 (Neb. 1907).

[58] 565 S.W.2d 879, 882 (Tenn. Ct. App. 1977) (emphasis added).

[59] William D. Flatt & Wesley R. Kliner, *When the Earth Moves and Buildings Tumble, Who Will Pay?—Tort Liability and Defenses for Earthquake Damage within the New Madrid Fault Zone*, 22 MEM. ST. U. L. REV. 1, 37 (1991).

[60] In this regard, the authors argue,

> [w]ith today's advanced research and technology, however, scientists . . . are better able to forecast an earthquake with an increasing degree of accuracy. Furthermore, advanced seismic design . . . ensures better survivability. Without the twin pillars of lack of predictability and lack of control, this defense is certainly on the wane as applied to earthquakes.

Id. at 39.

becomes more difficult to prove that an event is indeed unforeseeable and its consequences are unanticipated and unpreventable.

3. The Act of God Should be the "Sole Cause" of Loss

Even when an event can be considered an Act of God, the party invoking the defense still must prove that the Act of God is the sole cause of the loss. In this regard, one is actually faced with the possibility of commingling between natural disaster and human intervention. The requirement of the sole cause is perhaps the most distinct characteristic of an Act of God defense. U.S. courts have indeed shown a high degree of consistency in insisting that the Act of God must be the sole cause of the loss.[61]

Although there is no single definition of what constitutes the "sole cause" of an event, Fasoyiro notes that U.S. courts often require that the act be "occasioned exclusively by violence of nature without the interference of any human action."[62]

In the case involving the negligence rule, the sole cause test will look at the question of whether those invoking the Act of God defense are at fault. Bozeman indicates that where negligence has contributed to the damage in question, then the damage will not be considered as resulting from the Act of God.[63]

For example, in *Oklahoma Railway, Co. v Boyd*, the court held that "[o]ne is not liable for damage resulting solely from an 'act of God'; but if his negligence is a present contributing cause, which commingled with the 'Act of God,' produces the injury, then *he is liable notwithstanding the 'act of God.'*"[64] From this ruling, it appears that if a natural disaster is combined

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[61] Jill M. Fraley, *Re-Examining Acts of God*, 27 PACE ENVTL. L. REV. 669, 675 (2010). It should, however, be noted here that the author does not entirely agree with the requirement that the Act of God is the sole cause of the loss, especially for cases related to climate change. In this regard, the author finds that the requirement emerges from a classical legal fiction imagining that human acts can be meaningfully separated from the acts of nature. According to the author, this separation is no longer applicable when one is examining losses due to climate change, as climate change itself cannot be considered an event free from human intervention. *Id.* at 689–90.

[62] Laurencia Fasoyiro, *Invoking the Act of God Defense*, 3 ENVTL. & ENERGY L. & POL'Y J. 1, 13 (2009).

[63] Bozeman, *supra* note 40, at 427.

[64] 282 P. 157, 163 (Okla. 1929) (emphasis added); *accord* Ark. Valley Elec. Coop. Corp. v. Davis, 800 S.W.2d 420, 423 (Ark. 1990); Beauton v. Conn. Light & Power Co., 3 A.2d 315, 318 (Conn. 1938); Fairmont Creamery Co. v. Thompson, 298 N.W. 551, 554 (Neb. 1941); Dye v. Burdick, 553 S.W.2d 833, 839 (Ark. 1977); Oklahoma City v. Tarkington, 63 P.2d

with negligence on the side of the defendant, the Act of God defense will be rejected.

In some rulings, courts employed a wider interpretation of the phrase "sole cause." For instance, in *Butts v. City of South Fulton*, the court stated that for an Act of God to be accepted, damages should result solely from natural factors, without any human intervention or any influence from "the power of man."[65] Similarly, in *Curtis v. Dewey*, the court held that "[t]he distinguishing characteristic of an 'Act of God' is that it proceeds from the force of nature alone, *to the entire exclusion of human agency*."[66]

If the court finds the damage resulted from the commingling of a natural disaster and human actions, either in the form of active participation, neglect, or the failure to act, the natural disaster will be humanized, and the damage will be attributed solely to human action. Accordingly, the Act of God defense will be dismissed. Such a point of view can be found in the ruling of *Winchester Water Works Co. v. Holliday*, in which the court explicitly rejected the Act of God holding:

> The principle embodied in all of the definitions is that the act must be one occasioned exclusively by the violence of nature and all human agency is to be excluded from creating or entering into the cause of the mischief. *When the effect, the cause of which is to be considered, is found to be in part the result of the participation of man, whether it be from active intervention or neglect, or failure to act, the whole occurrence is thereby humanized, as it were, and removed from the operation of the rules applicable to the acts of God.* Thus if a party is in default for not performing a duty or not anticipating a danger, or where his own negligence has contributed as the proximate cause of the injury complained of, he cannot avoid liability by claiming that it was caused by an act of God.[67]

689, 690–91 (Okla. 1936); Manila School Dis. v. Sanders, 289 S.W.2d 529, 532 (Ark. 1956); Rix v. Alamogordo, 77 P.2d 765, 770 (N.M. 1938); Slater v. S.C. Ry. Co., 6 S.E. 936, 937 (S.C. 1888); Skandia Ins. Co. v. Star Shipped AS, 173 F. Supp. 2d 1228, 1241–42 (S.D. Ala. 2001); Freter v. Embassy Moving & Storage, Co., 145 A.2d 442, 444 (Md. 1958).

[65] 565 S.W.2d 879, 882 (Tenn. Ct. App. 1977).

[66] 475 P.2d 808, 810 (Idaho 1970) (emphasis added); *accord* Johnson v. Burley Irrigation Dist., 304 P.2d 912, 916 (Idaho 1956).

[67] 45 S.W.2d 9, 11 (Ky. Ct. App. 1931 (emphasis added).

Earlier, this Article asserted that a natural disaster qualifies as an Act of God if it was unforeseeable and unanticipated. Failure to prove that a natural event was unforeseeable and unanticipated will bar the Act of God defense, mean that the defendant is negligent. In other words, when a future natural event is considered foreseeable, and hence, can reasonably be anticipated, the defendant bears responsibility to anticipate and to take necessary preventative measures. If the defendant does not anticipate and take preventative measures, he does not satisfy his duty of care, and he will be liable. This is indicated in Justice Patterson's dissenting opinion in *Kimble v. Mackintosh Hemphill, Co.*, in which he urged that all foreseeable dangers be considered in determining whether an action is a negligent act. The Justice stated:

> It is a primary *social* duty of every person to take thought and have a care lest his action result in injuries to others. This social duty *the law* recognizes and enforces, and for any injury resulting from any person's lack of elementary forethought, the law holds that person accountable. A normal human being is held to foresee those injuries which are the consequences of his acts of omission or commission which he, as a reasonable human being, should have foreseen. . . . *All foreseeable dangers are to be considered* in the solution of the problem whether the creation of the situation was a negligent act.[68]

Indeed, the examination of the sole cause corresponds to the issue of unforeseeability in the sense that once an Act of God and its impacts are considered foreseeable, then there is a legal obligation to take due care to prevent the act. This obligation necessitates an examination of the defendant's anticipatory actions and the Act of God's actual consequences. In this regard, as Binder has indicated, the inadequacy of design, construction, inspection, and maintenance will result in the Act of God being considered as the act of people.[69]

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[68] 59 A.2d 68, 72 (Pa. 1948) (emphasis added).
[69] Binder, *supra* note 50, at 19.

4. The Act of God Defense Under Strict Liability?

One might wonder whether strict liability still allows the defendants to invoke the Act of God defense. The *Restatement (Second) of Torts* in § 519 and § 520, which explain strict liability, provides no information on the use of the Act of God defense.[70] Similarly, the *Restatement (Third) of Torts* § 23 does not clarify the use of the Act of God defense for cases based on strict liability.[71] The absence of such an explanation does not necessarily mean that the American Law Institute is of the opinion to rule out the Act of God defense for strict liability. In fact, in its comment on the negligence rule, the Institute states that the Act of God is an affirmative defense for the strict liability rule announced in *Rylands v. Fletcher*.[72] In addition, when explaining the scope of liability, the Institute makes a reference to some cases of strict liability in which the party was allowed to use the Act of God defense.[73]

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[70] RESTATEMENT (SECOND) OF TORTS §§ 519–520 (1977).

[71] RESTATEMENT (THIRD) OF TORTS : PHYS. & EMOT. HARM § 23 (2010).

[72] *Id.* § 3.

[73] *Id.* § 34 cmt. d. In this regard, the American Law Institute refers to *Smith v. Bd. of County Rd. Comm'rs*, 146 N.W.2d 702 (Mich. Ct. App. 1966), *Clark-Aiken Co. v. Cromwell-Wright Co.*, 323 N.E.2d 876 (Mass. 1975), and *Trotter v. Callens*, 546 P.2d 867 (N.M. Ct. App. 1976).

In *Smith v. Bd. of Cnty. Rd. Comm'r*, the court defined an Act of God as "an intervening or supervening force, which relieves from liability, is such a force of nature that it is so calamitous, so violent and so out of line with the history of natural forces in the area as to completely be unforeseeable by reasonable persons." Further, the court held that Act of God is a valid defense for cases involving strict liability, and it is a question to be determined by the jury. 146 N.W.2d 702, 703–04.

In *Clark-Aiken Co. v. Cromwell-Wright Co.*, the court followed previous rulings which acknowledge that an Act of God is an exception for liability under strict liability. 323 N.E.2d 876, 877.

In *Trotter v. Callens*, the court even explicitly challenged the RESTATEMENT (SECOND) OF TORTS § 522, which states that "[o]ne carrying on an abnormally dangerous activity is subject to strict liability for the resulting harm although it is caused by the unexpectable . . . operation of a force of nature." RESTATEMENT (SECOND) OF TORTS: CONTRIBUTING ACTIONS OF THIRD PERSONS, ANIMALS & FORCES OF NATURE § 522 (1977). Indeed, one might find that according to § 522, strict liability should not allow the use of the Act of God defense. The court in *Trotter v. Callens* rejected such a conclusion and stated that the court "see[s] no sound reason in logic or policy for not allowing this [Act of God] defense." 546 P.2d 867, 869. Hence, according to this court, an Act of God could be used as a reason to escape from strict liability. The court further stated that "an Act of God applies only to such an extraordinary and unexpected manifestation of the forces of nature as cannot be prevented by human care, skill or foresight; that is, such a cause as would have produced the injury independent of the defendants' actions." *Id.* at 869.

One could also take a look at several federal environmental acts, including the Federal Water Pollution Control Act (FWPCA), the Oil Pollution Act (OPA), and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), which all employ strict liability as the rule.[74] According to these acts, an Act of God is one among few valid reasons that can be used to escape from liability.[75] It has been argued that precisely due to the presence of these defenses that it is called strict liability and not absolute liability, which provides no defense for the injurers.[76] One court specifically stated that

> [s]trict liability under CERCLA, however, is not absolute; there are defenses for causation solely by an act of God, an act of war, or acts or omissions of a third party other than an employee or agent of the defendant or one whose act or omission occurs in connection with a contractual relationship with the defendant.[77]

In *Liberian Poplar Transports Inc. v. United States*, the plaintiff attempted to get reimbursement under the FWPCA for amounts incurred to cleanup oil that leaked from the plaintiff's vessels.[78] The plaintiff argued that the oil

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[74] It should be noted here that although these acts do not explicitly mention strict liability, scholars agree that the liability rule used by these acts is strict liability. For comments on the FWPCA, see for example: Paige Kohn, *Oil and Water Do Not Mix: An Argument for the United States Supreme Court's Deferral to Congress in* Exxon v. Baker, 38 CAP. U. L. REV. 229, 259 (2009–2010); Ryan Watson, *Shifting the Costs to Those Best Able to Bear Them: An Argument for the Adoption of Pure Economic Loss in the Event of an Oil Pipeline Spill in Nebraska*, 46 CREIGHTON L. REV. 115, 123 (2012). For comments on the OPA, see for example: Robert Force, Martin Davies & Joshua S. Force, *Deep Trouble: Legal Ramifications of the Deepwater Horizon Oil Spill Deepwater Horizon: Removal Costs, Civil Damages, Crimes, Civil Penalties, and State Remedies in Oil Spill Cases*, 85 TUL. L. REV. 889, 899 (2001). *See also* Kohn, *supra*, at 260–61; Watson, *supra*, at 124. For comments on CERCLA, see for example: ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 449–50 (7th ed. 2013); William L. Medford & Mugdha Kelkar, *CERCLA vs. Code: Reconciling Conflicting Goals*, 38 AM. BANKR. INST. L.J. 46, 46 (2011); Lynda Oswald, *Strict Liability of Individuals Under CERCLA: A Normative Analysis*, 20 B.C. ENVTL. AFF. L. REV. 579, 598–603 (1993).

[75] 33 U.S.C. §§ 311(f)(1)–(3), 1003(a)–(b), § 1321(f)(1), § 2703(a)–(b); 42 U.S.C. §§ 107(b); § 9607(b).

[76] Vernon Palmer, *A General Theory of the Inner Structure of Strict Liability: Common Law, Civil Law, and Comparative Law*, 62 TUL. L. REV. 1303, 1329 (1988).

[77] New York v. Shore Realty Corp., 759 F.2d 1032, 1042 (2d Cir. 1985).

[78] 26 Cl. Ct. 223, 224 (1992).

spill was caused by an Act of God, namely a storm encountered by the plaintiff's vessels. The court held that the FWPCA imposes strict liability upon the owner or operator of a vessel. However, the owner or operator can be excluded from liability if he "can prove that one of the exceptions does apply."[79] Hence, the plaintiff could escape from liability if the plaintiff was able to establish the Act of God defense. In this case the court followed the definition of an Act of God as given by the FWPCA, namely "an act occasioned by an unanticipated grave natural disaster."[80] The court rejected the plaintiff's claim that the storm "was not well forecasted, and was not visually foreseeable by the ship's watch, that the storm was not anticipated."[81] According to the court, the statute and the legislative history of the FWPCA do not rely on a subjective test to determine whether a natural event could be anticipated.[82] In this regard, since there was in fact a forecast before the storm hit the location, and there was also some indication of bad weather issued an hour before the storm struck, the court opined that the storm should have been anticipated.[83] Accordingly, the court rejected the plaintiff's Act of God defense.[84]

In *Apex Oil Co. v. United States*, a company sought to assert the Act of God defense to escape the strict liability standard under the OPA on the grounds that a barge accident, which led to the spills of slurry oil into the Mississippi River, was partly caused by an Act of God in the form of flood conditions.[85] The court followed the definition of Act of God as explained in the OPA: "an unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character the effects of which could not have been prevented or avoided by the exercise of due care or foresight."[86] In addition, the court found that the congressional intent of the OPA indicates that the Act of God defense should be interpreted more narrowly than the traditional Act of God defense, in the sense that the interpretation should be more limited in scope.[87] In order to explain what it meant by more limited in scope, the court referred to the rulings in *United States v. English* and *Reliance Ins. Co. v. United States*, which stated that the

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[79] *Id.* at 225.
[80] *Id.* at 226 (33 U.S.C. § 1321(a)(12)).
[81] *Id.*
[82] *Id.* at 225–26.
[83] *Id.* at 226.
[84] *Id.*
[85] 208 F. Supp. 2d 651 (E.D. La. 2002).
[86] *Id.* (citing 33 U.S.C. § 2701(1)).
[87] *Id.*

defenses under the OPA "are narrowly construed, and only in the situation where the discharge was totally beyond the control of the discharging vessel would the responsible party be excused from liability."[88] The court rejected the plaintiff's claim about the presence of an Act of God, in part because the court found that the plaintiff knowingly entered perilous river conditions which were both anticipated and predicted. Despite being fully advised of the conditions, the plaintiff operated barges with a tug, which had insufficient power to face the increasingly powerful current of the Mississippi River.[89] The Act of God defense was also rejected because the plaintiff failed to show that the Act of God was the sole cause of the damage.[90]

Several CERCLA cases have also discussed the use of Act of God defense to escape from liability. For example, in *United States v. Barrier Industries, Inc.*, the United States sued the owner of a hazardous waste site to recover costs for cleanup of the site.[91] The defendant resorted to the Act of God defense by arguing that the spills of hazardous wastes were caused by a bursting of pipes due to an "unprecedented cold spell."[92] The *Barrier Industries* court rejected the defendant's claim because the "unprecedented cold spell" did not fall into the category of an Act of God defense under CERCLA. The court referred to the definition of an Act of God set forth in CERCLA as "an unanticipated natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight."[93] The court also contended that this definition only allows an exception for liability if the release or threatened release of hazardous substances was "solely" caused by an Act of God. Because the accident

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[88] *Id.* at 654 (citing United States v. English, 2001 WL 940946 (D. Haw.); Reliance Ins. Co. v. United States, 677 F.2d 844 (Ct. Cl. 1982)). In *Reliance Ins. Co. v. United States*, the Court further stated that "only where the owner's or operator's conduct was so indirect and insubstantial as to displace him as a causative element of the discharge would he be relieved of responsibility and, correspondingly, financial liability." 677 F.2d 844, 849 (Ct. Cl. 1982). With this statement, it could be argued that the court in *Reliance Ins. Co. v. United States* has narrowed the interpretation of the Act of God defense by emphasizing the element of "the sole cause." In this regard, an Act of God will be considered a valid defense when the court finds that the act of man is so indirect and insubstantial to be regarded the cause of the damage. *Id.*

[89] *See Apex Oil Co.*, 208 F. Supp. 2d at 656–57.

[90] *Id.* at 658–59.

[91] 991 F. Supp. 678, 679 (S.D.N.Y. 1998).

[92] *Id.*

[93] *Id.* (citing 42 U.S.C. § 9601(1)).

involved some human contribution, the Court dismissed the Act of God defense.[94]

In *United States v. Alcan Aluminum Corp.*, the defendant, an aluminum manufacturer, dumped oily wastes into a borehole that led to the Butler Tunnel site, a network of underground mines and related tunnels and waterways bordering the Susquehanna River.[95] The mine workings at the site were drained through a tunnel that fed directly into the river.[96] The U.S. Government sued the defendant to recover response costs. The defendant, however, argued that the oil emulsion had been commingled with other oily wastes containing hazardous substances, which were discharged into the Susquehanna River in the wake of Hurricane Gloria.[97] Hence, the defendant invoked the Act of God defense, by arguing that the release of hazardous substances was caused by Hurricane Gloria. The court relied on the definition of an Act of God set forth in CERCLA and stated that under this defense no liability will be attributed to a person if that person can prove that the release of hazardous substances and the resulting damage were solely caused by an Act of God.[98] The court first found no evidence indicating that Hurricane Gloria was the sole cause of the release of hazardous substances. Second, the court maintained that the impacts of Hurricane Gloria could "have been prevented or avoided by the exercise of due care or foresight."[99] If the defendant would have exercised due care it would have prevented the dumping of oily wastes into a borehole of mine workings. Finally, the court followed the ruling in *United States v. Stringfellow*, which excluded heavy rainfall from the category of the Act of God defense.[100]

As indicated above, the Act of God defense can be used as a reason to escape liability under strict liability. However, one might argue that the test for the Act of God defense under strict liability is quite different from the test under the negligence rule. The difference is especially relevant with respect to the test concerning the "sole cause" element of the defense. In this case, it is generally accepted that under strict liability the absence of negligence will

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[94] *Id.* at 679–80.
[95] 892 F. Supp. 648, 651 (M.D. Pa. 1995).
[96] *Id.* at 651.
[97] *Id.* at 652.
[98] *Id.* at 649 (citing 42 U.S.C. § 9607(b)).
[99] *Id.* at 658.
[100] *Id.*; United States v. Stringefellow, 661 F. Supp. 1053, 1061 (C.D. Cal. 1987).

not absolve the defendant of liability.[101] This means that when one invokes the Act of God defense under strict liability, one cannot use the reason that one is not negligent. This is because, as Fasoyiro observes, the test for the Act of God defense under strict liability is causation-based, and not fault-based.[102]

Similarly, Binder argues that since the issue of the foreseeability of the risk is a question of a negligence analysis, then under strict liability the analysis should focus on the question of whether the occurring damage falls within the projected risk encompassed by the application of strict liability. If the answer is positive, then the unforeseeable nature of the impact is irrelevant.[103]

Another important point to note is the tendency to interpret the Act of God defense rather narrowly. As indicated especially in *Liberian Poplar Transports, Inc. v. United States* and *Apex Oil Co. v. United States*, courts are inclined to disregard the polluters' subjective point of view with respect to the issue of foreseeability of harm.[104] Insistence that the Act of God be the sole cause also exemplifies the narrow interpretation courts often take. A narrow interpretation of the Act of God defense expands the scope of liability, making it more difficult for the injurers to escape from liability.

5. Causation, the Burden of Proof, and Apportionment

All selected cases in this Article seem to indicate a general agreement that those who claim the presence of an Act of God must prove that the Act of God in question was exceptional, unforeseeable, unanticipated, and the sole cause of the incurred losses. The next, more important questions become how the defense corresponds to the question of causation and how to apportion damages relative to the contribution of negligence or one's activity to the damage incurred.

In the context of the Act of God defense, some courts required that a natural disaster should not only be a proximate cause of a loss, but should also be the sole cause. In *Kennedy v. Union Electric Co. of Missouri*, the

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[101] *See, e.g.*, Apex Oil Co. v. United States, 208 F. Supp. 2d 651, 652 (E.D. La. 2002) (stating that "[l]iability under the OPA and CERCLA is strict, and the absence of fault, or the exercise of due care is not a defense" (internal citations omitted)).

[102] Fasoyiro, *supra* note 62, at 17–18.

[103] Binder, *supra* note 50, at 61–64.

[104] Liberian Poplar Transp Inc. v. United States, 26 Cl. Ct. 223, 226 (1992); *Apex Oil Co.*, 208 F. Supp. 2d at 654.

court established a link between an Act of God and causation, by saying that "the act of God *was not only a proximate cause but was the sole cause.*"[105] In other words, for a natural disaster to be successfully employed as in the 'Act of God' defense, the natural disaster should not only be a concurring or contributing cause, but more importantly should also be the superseding cause.[106]

Furthermore, the Utah Supreme Court in *Charvoz v. Bonneville Irrigation Dist.* attempted to make a distinction between the terms "sole cause" and "primary cause."[107] According to the *Charvoz* court, primary cause refers to a plural condition, in which there are multiple causes; while sole cause refers to a single condition, in which there is only one cause, no other cause.[108] This is reaffirmed in *United States v. West of England Ship Owner's Mutual Protection & Indemnity Ass'n*, where the court interpreted the term "sole cause" to mean: single, alone, and without an associate cause.[109]

It becomes clear, thus, that in order for a natural event to be accepted as a defense to escape from liability, the event must be the sole cause of the incurred losses. Consequently, whenever the court observes another cause in the forms of negligence or human intervention, the Act of God defense is very likely to be rejected. It seems, hence, that from a legal perspective, there is a clear dividing line between a natural cause and human cause, enabling an Act of God and human negligence or act to cancel each other out. This is clearly found in the ruling of *Sky Aviation Corp. v. Colt*, where the court was of the opinion that "[i]n order for the rule to apply, the 'Act of God' must be the sole cause of the injury. *There can be no combination of an act of God and the fault of man* as the presence of one excludes the other."[110]

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[105] 216 S.W.2d 756, 762 (Mo. 1948) (emphasis added) (citation omitted); *accord* Ark. Valley Elec. Coop. v. Davis, 800 S.W.2d 420, 423 (Ark. 1990); Apex Oil Co. v. United States, 208 F. Supp. 2d 642, 658 (E.D. La. 2002); Dickman v. Truck Transport, Inc., 224 N.W.2d 459, 465 (Iowa 1974); Dye v. Burdick, 553 S.W.2d 833, 839 (Ark. 1977); Joseph Resnick, Co. v. Kaisha, 241 N.Y.S.2d 134, 136 (N.Y. City Civ. Ct. 1963).

[106] *See* Wolff v. Light, 156 N.W.2d 175, 180 (N.D. 1968) (holding that "[i]t must be more than a mere concurrent and contributing cause; it must be a responsible cause or a superseding cause, that is, one which has superseded that original act or been itself responsible for the injury"); *see also* S. Pac. Co. v. City of L.A., 55 P.2d 847 (holding that a rainstorm of unusual intensity does not supersede the original negligence as proximate cause of an injury).

[107] 235 P.2d 780, 782 (Utah 1951).

[108] *Id.*

[109] 872 F.2d 1192, 1197 (5th Cir. 1989).

[110] 475 P.2d 301, 304 (Wyo. 1970) (emphasis added).

Although in several cases there are attempts to humanize an Act of God whenever there is a comingling between an Act of God and a human act, by which the tortfeasor will be held liable despite the Act of God, one may nevertheless still argue for an apportionment of liability and compensation according to the contribution of the human act or negligence to the incurred losses. A question thus arises as to which party bears the burden of proof with respect to the apportionment of liability. In several cases, the courts held that the party who seeks for an Act of God bears the burden to show the extent of his or her contribution to the incurred losses. In these cases, apportionment is thus directly linked to human contribution to an accident. If the party fails to prove his or her contribution to the damage, i.e., the percentage of the negligence or actions to the incurred losses, the party will be held liable for all consequences or losses.[111] On this ground, Rundall infers that courts are rather hesitant to apportion liability based on the relative contribution of fault or human act to the incurred losses as compared to the contribution of an Act of God.[112] The courts' point of view has thus made it difficult for the tortfeasor to ask for an apportionment of liability. Accordingly, one may argue that the courts are actually quite consistent with the requirement that an Act of God should be the sole cause of the incurred losses, by which the tortfeasor will be held liable for the whole incurred losses whenever the courts find that the tortfeasor's negligence or act contributes to the emergence of the losses.

IV. NATURAL DISASTERS AND NUCLEAR ACCIDENTS

This section uses nuclear liability law as an example to show whether a natural disaster can be used as a defense to exclude liability. A nuclear accident may be caused by a combination of natural and man-made factors. The Fukushima Accident, which happened in Japan in 2011, is an example of this. The Great East Japan earthquake that shook the east coast of Japan and the consequent tsunami were the direct triggers of the accident. However, a detailed analysis shows that many man-made factors contributed to the tragedy as well.[113] The power plant, located on the east coast of Japan,

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[111] United States v. Alcan Alumunium Corp., 892 F. Supp. 648, 657 (M.D. Pa. 1995); *see also* Rix v. Town of Alamogordo, 77 P.2d 765, 770 (N.M. 1938) (stating that appellant assumed a heavy burden of showing that the defendant was not negligent and thus did not contribute to cause the damage).

[112] Rundall, *supra* note 33, at 761.

[113] We will come back to the Fukushima accident below in Part V.*B*.

is very vulnerable to tsunami risks, and raises questions about the operator's location decision. Moreover, the design of the power plant was not flood-resistant; all the emergency battery and electricity facilities were located at the turbining buildings, which were immediately flooded when the tsunami arrived. Hence, the question arises whether the tsunami can be regarded as a valid defense to protect the operator from liability. This, of course, is not only a specific concern of Japan as nuclear accidents can be catastrophic and can have a broad, transnational impact. As such, it is helpful to examine international regimes dealing with nuclear accidents and the extent to which they consider a natural disaster to be a defense for nuclear liability.

Many Western countries started to develop the nuclear industry to meet their increasing energy needs since the 1950s. However, a few barriers to the development existed, like the serious public concern about sufficient protection against potential damage, and the hesitation of investors to step into such a high risk industry.[114] To guarantee a certain level of compensation for potential victims, relieve the nuclear investors from the potential heavy claims, and promote the peaceful use of nuclear energy, the governments tried to establish domestic nuclear liability acts and international conventions on nuclear liability.

This Article will first address the so-called first generation conventions that emerged in the 1960s in subpart *A* and then look at some post-Chernobyl developments in subpart *B*. The United States is not a member of the international regime but developed its own nuclear liability and compensation regime through the Price-Anderson Act of 1957.[115] These nuclear liability rules and how the Act of God defense is treated in the United States will be examined in subpart *C*.

A. The First Generation Conventions

In the 1960s, two international compensation regimes were established for nuclear damage: the Organization for Economic Co-operation and Development (OECD) regime and the International Atomic Energy Agency (IAEA) regime. The July 29, 1960 Convention on Third Party Liability in the

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[114] Julia A. Schwartz, *International Nuclear Third Party Liability Law: The Response to Chernobyl*, *in* INT'L NUCLEAR LAW IN THE POST-CHERNOBYL PERIOD 37, 38–39 (2006).

[115] Act to Amend the Atomic Energy Act of 1954 (Price-Anderson Act), Pub. L. No. 85-256, 71 Stat. 576 (1957).

Field of Nuclear Energy (Paris Convention)[116] and the January 31, 1963 Convention Supplementary to the Paris Convention on Third Party Liability in the Field of Nuclear Energy (Brussels Supplementary Convention) were developed under the auspices of the OECD Nuclear Energy Agency (NEA).[117] The second regime, the May 21, 1963 Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention), was developed under the aegis of the IAEA.[118] These two regimes are usually referred to as the first generation of nuclear liability conventions.[119]

Since the Paris Convention and the Brussels Convention are established under the auspices of the OECD and NEA, they are regionally confined to Western Europe, Slovenia and Turkey. The Vienna Convention, under the aegis of the IAEA is worldwide in scope. These two regimes have some similar characteristics, such as strict liability, an exclusive channeling of liability to nuclear operators, a limitation of the liability in amount and in time, and compulsory financial security.[120]

In Western Europe, there is a long-established tradition of a presumption of liability for hazards resulting from a dangerous activity. The nuclear industry covered under the Paris Convention is obviously qualified as a dangerous activity and there is a serious difficulty in proving negligence of nuclear operators. Therefore, a system of absolute liability is established under the Paris Convention.[121] According to the Paris Convention, the operator is liable for damage caused by a nuclear incident in a nuclear installation or involving nuclear substances coming from such

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[116] Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, 956 U.N.T.S. 251 [hereinafter Paris Convention].

[117] Convention Supplementary to the Paris Convention on Third Party Liability in the Field of Nuclear Energy, Jan. 31, 1963, 1041 U.N.T.S. 358.

[118] Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, 1063 U.N.T.S. 358 [hereinafter Vienna Convention].

[119] *See* Michael G. Faure & Tom Vanden Borre, *Compensating Nuclear Damage: A Comparative Economic Analysis of the U.S. and International Liability Schemes*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 219, 229, 240 (2008).

[120] For more detailed discussion of these legal doctrines in international nuclear liability conventions, see Norbert Pelzer, *Focus on the Future of Nuclear Liability Law*, 17 ENERGY & NAT. RES. L. 332, 334–341 (1999); Tom Vanden Borre, *Nuclear Liability: An Anachronism in EU Energy Policy?*, *in* EUROPEAN ENERGY LAW REPORT, at VII, 184, 198 (Martha M. Roggenkamp & Ulf Hammer eds., 2010).

[121] Nuclear Energy Agency, Exposé des Motifs, Revised Text of the Exposé des Motifs of the Paris Convention, approved by the OECD Council on the 16th November 1982, ¶ 14 [hereinafter Exposé des Motifs], *available at* https://www.oecd-nea.org/law/nlparis_motif.html (last visited Oct. 8, 2014).

installations.[122] To prove the fault of nuclear operators it is no longer necessary to establish liability. The liability established under the Paris Convention is quite stringent and is referred to as absolute liability since many classic exonerations, such as *force majeure*, Acts of God, or intervening acts of third persons, under general tort law are no longer applicable.[123] The available exonerations are an act of armed conflict, hostilities, civil war, and insurrection.[124] Those disturbances are either of an international or of a political nature, so that they are regarded as "the responsibility of the nation."[125] The operator is not liable for damage caused via a grave natural disaster of an exceptional character unless the legislation of the contracting party in whose territory his nuclear installation is situated provides to the contrary.[126] This defense was considered justified by the drafters since this type of disaster is catastrophic and completely unforeseeable. Thus, it should fall into the responsibility of the nation as a whole rather than within the scope of the operator's individual liability.[127]

Similar stipulations about absolute liability and exonerations can also be found under the Vienna Convention.[128] However, under the Vienna Convention, there is an additional possibility for the operator to be relieved of his liability: a competent court can, according to the applicable law, relieve the operator wholly or partly from his obligation if the operator can prove that damage resulted from gross negligence or an act or omission of the victims.[129]

The negotiations of the Vienna Convention show that the adoption of grave natural disaster as an optional exoneration was not without debate. During the International Conference on Civil Liability for Nuclear Damage (when the Vienna Convention was created), a few delegates, such as the United States and Philippines, proposed to delete "a grave natural disaster of an exceptional character" as a defense.[130] Various delegates proposed doing

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[122] Paris Convention, *supra* note 116, art. III(a).
[123] Exposé des Motifs, *supra* note 121, ¶ 48.
[124] Paris Convention, *supra* note 116, art. IX.
[125] Exposé des Motifs, *supra* note 121, ¶ 48.
[126] Paris Convention, *supra* note 116, art. IX.
[127] Exposé des Motifs, *supra* note 121, ¶ 48.
[128] Vienna Convention, *supra* note 118, arts. I(1)(K), IV(1)(3).
[129] *Id.* art. IV(2).
[130] *See* International Atomic Energy Agency, Official Records of the International Conference on Civil Liability for Nuclear Damage (Apr. 29–May 19, 1963), at 247–48 [hereinafter IAEA Records], *available at* http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/42/080/43080878.pdf.

away with the exoneration of liability in the case of a natural disaster arguing that the draft convention accepted absolute liability as a result of which exonerations should be defined as narrowly as possible.[131] Serious nuclear damage was also considered to be most likely caused by natural disasters and the more dangerous an undertaking was, the more the possibilities of exoneration should be reduced.[132] It was also stressed that the risks should be borne by the party who created them and that the nuclear operator had greater capacity to prevent the damage than the public.[133]

However, delegates from many countries held that the defense of natural disaster should be retained and that the use of this defense should depend on the installation states. Japan, like the United States, played an active role during the negotiation procedure but, did not join the Vienna Convention in the end. In the discussion concerning the article related to exonerations, Japan argued that it is very vulnerable to natural disasters. However, those risks were usually excluded from liability insurance policies. As a result, holding nuclear operators liable in such cases would leave them uncovered by financial security. Thus, Japan argued that whether grave natural disasters could exonerate operators from liability should be subject to the law of installation states.[134] Additionally, it was agreed that natural disasters were not man-made, but were of the same nature as wars in terms that the operators are not in charge of them. Hence, it was argued that war and natural disasters should be treated equally as exonerations.[135] Moreover, it was argued that to cover natural risks under insurance, if possible at all, is very expensive and the states don't want to overburden their nuclear industry.[136] After two days of debate, Japan's proposal was accepted: act of armed conflict, hostilities, and civil war or insurrection were adopted as exonerations, and a grave natural disaster of an exceptional character was kept only as a defense if the law of the installation state provides no contradictory provisions.

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[131] *Id.* at 249.
[132] *Id.*
[133] *Id.*
[134] *Id.*
[135] *Id.*
[136] *Id.*

B. New Developments

The first generation of nuclear liability conventions have made an effort to establish international and regional regimes for nuclear liability. However, they have obvious limitations in terms of restricted geographical, scope narrow definitions of nuclear damage, and insufficient amount of available compensation.[137] The Chernobyl accident in 1986 has triggered an intensive discussion about those limitations and led to the later revision process of the existing regimes.[138] The so-called second generation of nuclear liability conventions were established thereafter. Those conventions consist of the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (Joint Protocol),[139] the Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage (the Protocol to the Vienna Convention),[140] the Convention on Supplementary Compensation for Nuclear Damage (CSC),[141] the Protocol to amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 (the Protocol to the Paris Convention)[142] and the Protocol to amend the Convention of 31 January 1963 supplementary to the Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy (the Protocol to the Brussels Supplementary Convention).[143]

Under the regimes of both NEA and IAEA, a few important changes have been made, especially the broadened scope of nuclear damage and the

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[137] *See* Borre, *supra* note 120, at VII, 184, 192; Roland Dussart Desart, *The Reform of the Paris Convention on Third Party Liability in the Field of Nuclear Energy and of the Brussels Supplementary Convention: An Overview of the Main Features of the Modernisation of the Two Conventions*, *in* INTERNATIONAL NUCLEAR LAW IN THE POST CHERNOBYL PERIOD 215–41 (2006).

[138] JULIA SCHWARTZ, ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT INTERNATIONAL NUCLEAR THIRD PARTY LIABILITY LAW: THE RESPONSE TO CHERNOBYL 41–44 (2006), *available at* https://www.oecd-nea.org/law/chernobyl/SCHWARTZ.pdf.

[139] Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention, *opened for signature* Sept. 21, 1988.

[140] Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, *opened for signature* Sept. 29, 1997 [hereinafter Protocol to the Vienna Convention].

[141] Convention on Supplementary Compensation for Nuclear Damage, *opened for signature* Sept. 29, 1997.

[142] Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as Amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982, *adopted* Feb. 12, 2004 [hereinafter Protocol to the Paris Convention].

[143] Protocol to Amend the Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy, as Amended by the Additional Protocol of 28 January 1964 and by the Protocol of 16 November 1982, *adopted* Feb. 12, 2004.

decreased amount of the limitation of liability. For example, under the Protocol to the Paris Convention, in addition to personal injury and property damage, parts of pure environmental damage are also compensable.[144] The scope of liability in time and in amount is also increased.[145]

As far as the defenses to nuclear liability are concerned, they are further limited in the second generation of nuclear liability conventions: the natural disasters are no longer an applicable defense. The only still available defenses are that the nuclear incident is caused directly by armed conflict, hostilities, civil war or insurrection.[146] It is worth noting that terrorism increasingly became a concern since the September 11, 2001 attacks on the World Trade Center in 2001, also in the field of nuclear damage coverage.[147] However, until now, terrorism per se was not a cause of exoneration under IAEA or OECD regimes. Whether damage caused by terrorism can exonerate the nuclear operators depends on whether such an act rises to the level of "armed conflict, hostilities, civil war or insurrection."[148] There is some discord with the wording of these exonerations: it is argued that both "civil war" and "insurrection" can be included in the term "armed conflict"

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[144] In the Protocol to the Paris Convention, four new titles have been added to the concept of "nuclear damage": the economic loss arising from personal injury and property damage; the costs of measures of reinstatement of the impaired environment; the loss of income deriving from a direct economic interest in any use or enjoyment of the environment; and the costs of preventive measures. Protocol to the Paris Convention, *supra* note 142, art. I. Similar provisions can also be found in the Protocol to the Vienna Convention. Protocol to the Vienna Convention, *supra* note 140, art. I(k).

[145] Since the health impact of nuclear radiation may not manifest itself for decades, the revised conventions also extend the statute of limitations for claims for personal injury and death. Those kinds of claims need to be brought within thirty years from the date of the accident. *See* Protocol to the Paris Convention, *supra* note 142, art. VIII(a)(i); Protocol to the Vienna Convention, *supra* note 140, art. VI(1)(a)(i). The amount of liability and public funds are also increased. *See* Protocol to the Paris Convention, *supra* note 142, art. VII(a)(b); Protocol to the Brussels Complementary Convention art. III(b); Protocol to the Vienna Convention, *supra* note 140, art. V(2).

[146] Protocol to the Paris Convention, *supra* note 142, art. IX; Protocol to the Vienna Convention, *supra* note 140, art. IV(3).

[147] *See* Nathalie Horbach et al., *Terrorism and Nuclear Damage Coverage*, 20 J. ENERGY & NAT. RES. L. 231, 231 (2002).

[148] International Atomic Energy Agency, The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage, Explanatory Texts, IAEA International Law Series No. 3, at 49 (2007) [hereinafter Explanatory Texts], *available at* http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1279_web.pdf (last visited Oct. 13, 2014).

according to international humanitarian law. Besides, the word "hostilities" is considered to be too ambiguous.[149]

The further limitation of the defenses is in line with the trend of providing more protection to victims in the revisions of nuclear liability conventions. Since, as Fukushima showed, nuclear facilities may not be able to resist grave natural disasters, allowing such defenses may deprive the victims of compensation.[150] The explanatory text of the Protocol to Vienna Convention clarifies the reasons for the abrogation of the national disaster defense. The nuclear installations are supposed to be built and maintained to withstand grave natural disasters, including even the ones of an exceptional character.[151]

C. Nuclear Liability and Act of God Defense in the U.S.

As mentioned earlier, the United States is not a member of the international conventions. Therefore, how nuclear liability is arranged and whether Act of God is an available defense in the United States requires examination of United States law separately from the international conventions.

In the 1950s the United States started to move towards peaceful uses of nuclear energy and to allow private participation in nuclear power.[152] The Atomic Energy Act of 1954 allowed for the first time private possession of nuclear fuel.[153] However, private investment lagged because of the unpredictability of potential liability and the unwillingness of the private insurance industry to provide sufficient coverage.[154] Therefore, the Price-Anderson Act of 1957 (the PAA) was enacted to provide nuclear liability rules and a system of financial responsibility.[155] The PAA has a dual-purpose: "to protect the public and to encourage the development of the

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[149] *Id.*

[150] Desart, *supra* note 137, at 231.

[151] Explanatory Texts, *supra* note 148, at 48.

[152] John V. Buffington, *The Price-Anderson Act: Underwriting the Ultimate Tort*, 87 DICK. L. REV. 679, 681–82 (1982).

[153] *Id.* at 682.

[154] *Id.* at 682–83; ANALYSIS OF THE PRICE-ANDERSON ACT 3 (1980).

[155] The Price-Anderson Act was originally adopted in 1957. Act to Amend the Atomic Energy Act of 1954, Pub. L. No. 85-256, 71 Stat. 576 (1957). It was recently revised by the Energy Policy Act of 2005, Pub. L. No. 109-58,119 Stat. 779 (2005). The NRC also adopted many regulations about the nuclear industry. The parts relevant to financial protection and compensation are compiled under Title 10, Part 140 of Code of Federal Regulations. 10 C.F.R. §§ 140.1–.109.

atomic energy industry."[156] The dual purpose can be seen in the provisions about limitation of liability and financial protection provided by the government.

To ease the concerns of investors, the PAA exempts the licensees and contractors from unlimited liability.[157] It adopts a limitation on aggregate public liability for a single nuclear incident. The nuclear operators are asked to seek primary financial protection up to a maximum amount available from private sources ($60 million when the PAA was passed), including private liability insurance and self-insurance.[158] The operators were mandated to further purchase $500 million from a government indemnification policy.[159] The liability was then capped at $560 million.[160] This structure creates an economic channeling of liability.[161] It required the nuclear operators to seek financial protection and hence exposed the major burden of compensation to the operators. The other parties who may contribute to the risks, such as nuclear suppliers or designers can also be held liable. Therefore, a legal channeling of liability as in the international regime does not exist under the PAA.

An important shift happened in 1975 when the operators were asked to bear the financial burden themselves instead of getting support via government indemnity.[162] Though the total amount of compensation was kept the same as that in 1957, a new tier of compensation, the retrospective premium, was introduced in place of the indemnity provided by the government. All operators should pay the retrospective premiums in the case of an incident in excess of the primary liability coverage up to the amount of $5 million.[163] The amount of primary financial protection and retrospective premiums has been increased over the years. Now, the primary financial protection was set as $375 million, and the retrospective premium for each

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[156] Pub. L. No. 85-256, 71 Stat. 576, at 576.

[157] *Id.* at 577.

[158] *Id.*; Richard McClure, *A Review of Nuclear Energy Insurance*, PROCEEDINGS OF THE CASUALTY ACTUARIAL SOCIETY, vol. LV, at 256 (1968).

[159] Pub. L. No. 85-256, 71 Stat. 576, 577.

[160] *Id.* at 577–88 ("The aggregate liability for a single nuclear incident of persons indemnified, including the reasonable costs of investigating and settling claims and defending suits for damage, shall not exceed the sum of $500,000,000 together with the amount of financial protection required of the licensee or contractor.").

[161] Tom Vanden Borre, *Shifts in Governance in Compensation for Nuclear Damage, 20 Years After Chernobyl*, *in* SHIFTS IN COMPENSATION FOR ENVIRONMENTAL DAMAGE 261, 300 (Michael Faure & Albert Verheij eds., 2007).

[162] H.R. REP. NO. 94-648, at 10 (1975); S. REP. NO. 454, at 10 (1975).

[163] Pub. L. No. 94-197, 1975 HR 8631, 89 Stat. 1111.

operator from each incident should not exceed $121,255,000 per reactor per accident plus 5% for legal expenses since September 10, 2013.[164] Given the current number of operating reactors, the maximum compensation for a nuclear incident is up to $13.6 billion.

When the PAA was passed in 1957, it tried to keep tort law intact. At that moment, suits for damages were brought under the state law where the nuclear accident occurred.[165] From 1957 until 1966 when the PAA was renewed, there was no assurance that strict liability would be imposed in all states.[166] There were some jurisdictions which purported to reject the doctrine of strict liability and a sizable number of others where the law relative to strict liability was unsettled.[167] Negligence rules were, however, considered insufficient to provide protection for the public, given the difficulties to prove the negligence.[168] The short statute of limitation under state law may also bar the victims from compensation as the damage may not manifest itself until many years after the accident.[169] Considering the insufficiencies of the state law, Congress proposed to establish a federal rule of strict liability for the claims under the PAA. The nuclear industry opposed a federal strict liability rule believing that such a rule would inhibit the development of nuclear power and make the public apprehensive.[170] Such a federal rule was regarded as contradictory to the principle of keeping interference with state law at a minimum.[171] Therefore, it was rejected.[172] Instead, in the 1966 PAA, the nuclear industry waived certain defenses when the nuclear accident comprises an "extraordinary nuclear occurrence" (ENO).[173] The defenses included:

> (i) any issue or defense as to conduct of the claimant or fault of persons indemnified, (ii) any issue or defense as to charitable or governmental immunity, and (iii) any issue or defense based

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[164] 10 C.F.R. § 140.11(a)(4) (2013).

[165] Leslie Lass, *The Price-Anderson Act: If a "Chernobyl" Occurs in the United States, Will the Victims Be Adequately Compensated?*, 7 GLENDALE L. REV. 200, 206 (1987).

[166] S. REP. NO. 89-1605 (1966), *reprinted in* 1996 U.S.C.C.A.N. 3201.

[167] *Id.*

[168] Lass, *supra* note 165, at 206–07.

[169] Harold P. Green, *Nuclear Power: Risk, Liability and Indemnity*, 71 MICH. L. REV. 479, 495 (1973).

[170] *Id.* at 496.

[171] *Id.*

[172] S. REP. NO. 89-1605 (1966), at 9–10, *reprinted in* 1996 U.S.C.C.A.N. 3201, 3209–10.

[173] 42 U.S.C. § 2210(n) (1966).

> on any statute of limitations if suit is instituted within three years from the date on which the claimant first knew, or reasonably could have known, of his injury or damage and the cause thereof, but in no event more than twenty years after the date of the nuclear incident. The waiver of any such issue or defense shall be effective regardless of whether such issue or defense may otherwise be deemed jurisdictional or relating to an element in the cause of action.[174]

This provision also stipulates explicitly that certain defenses are not excluded, such as "a defense based upon a failure to take reasonable steps to mitigate damages" and "injury or damage to a claimant or to a claimant's property which is intentionally sustained by the claimant or which results from a nuclear incident intentionally and wrongfully caused by the claimant."[175] It is worth noting that Act of God is not included in the waivers mentioned above. Therefore, claims may still be possible even if an Act of God exists.[176]

The above analysis shows that the waivers only apply in case of an ENO. Whether an accident comprises an ENO is determined by the NRC. To be qualified as an ENO, a nuclear incident needs to satisfy the following criteria: the discharge or dispersal constitutes a substantial amount of source, special nuclear or byproduct material, or has caused substantial radiation levels offsite; and there have in fact been or will probably be substantial damages to persons offsite or property offsite.[177] The NRC regulations give detailed criteria in determining whether the above mentioned conditions come due.[178] The legislation restricts the waivers to ENOs for two reasons: to avoid "nuisance" suits and to protect the public from the consequences of catastrophic nuclear accidents.[179] However, the substantial criteria are very difficult to satisfy. Even the Three Mile Island accident was not classified as an ENO.[180] After the Three Mile Island accident, revision of the criteria of

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[174] *Id.*

[175] *Id.*

[176] Jay Martin Siegel & Robert A.K. Welch, *The New Price-Anderson: Is the U.S. Moving Toward International Agreement on Nuclear Indemnity?*, 7 VA. J. INT'L L. 157, 167 (1966).

[177] 10 C.F.R. § 140.81(b).

[178] *Id.* §§ 140.84–.85.

[179] Dean Tousley, *Abolishing the "Extraordinary Nuclear Occurrence" Threshold of the Price-Anderson Act*, 14 U. MICH. J.L. REFORM 609, 617–18 (1981).

[180] Metropolitan Edison Co. (Three Mile Island, Unit 2), 11 N.R.C. 519, 1980 WL 18885 (1980).

an ENO proposed to the NRC.[181] The NRC also identified the difficulties in determining an ENO,[182] and published three proposed amendments to the criteria in 1985 and solicited public comment on these amendments.[183] Some scholars even advised the NRC to abolish the threshold of an ENO to allow better protection to victims.[184] However, after the procedure of public comments on the proposed amendments, the NRC decided that the current criteria for determining an ENO were adequate and were consistent with the intent of Congress, and thus should be sustained.[185] Under this situation, the majority of claims for nuclear damage may still not arise out of an ENO.[186]

Therefore the question left is which type of liability rules will apply when an incident is not identified as an ENO. One federal district court held that the PAA did not preempt state law in a "sub threshold" accident in *Silkwood v. Kerr-McGee Corp.*[187] Therefore, whether strict liability would apply and which defenses were allowed was determined by the state law. Recall that states varied in their attitudes toward strict liability in the 1960s.[188]

A shift happened in 1988. A sole and exclusive federal cause of action for any property damage or personal injury from radiation exposure, the Public Liability Action (PLA) was established in the 1988 Amendment Act.[189] The term "Public liability action" is defined broadly to contain "any suit asserting public liability." The Price-Anderson Act also defines the related concepts "public liability" and "nuclear incident" broadly.[190] Through those broad definitions, Congress preempted all state causes of action. There are two types of PLA causes of action: the cause of action for personal injury and that for property damage.[191] As for the substantive rules

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[181] Proposed Rules Nuclear Regulatory Commission, 65 FR 61283-01, 2000 WL 1577628 (F.R. 2000).

[182] U.S. Nuclear Regulatory Commission, The Price-Anderson Act—The Third Decade (Report to Congress), NUREG-0957 (1983).

[183] 50 FR 13978-01.

[184] Tousley, *supra* note 179, at 609–30.

[185] *See* Proposed Rules Nuclear Regulatory Commission, *supra* note 181.

[186] Andrew Roman et al., *Canada and International Nuclear Liability*, *available at* http://www.millerthomson.com/assets/files/article_attachments/Canada_and_International_Nuclear_Liability.PDF (last visited Oct. 13, 2014).

[187] 485 F. Supp. 566 (W.D. Okla. 1979).

[188] *See* S. REP. NO. 89-1605 (1966).

[189] Donald E. Jose & Michael A. Garza, *The Complete Federal Preemption of Nuclear Safety Should Prevent Scientifically Irrational Jury Verdicts in Radiation Litigation*, 2 TEMP. J. SCI. TECH. & ENVTL. L. 1, 13 (2007).

[190] 42 U.S.C. § 2014(q)(w).

[191] Jose & Garza, *supra* note 189, at 16.

in deciding the action, they "shall be derived from the law of the State in which the nuclear incident involved occurs, unless such law is inconsistent with the provisions of such section."[192]

The waivers of defenses still apply in case of ENOs. Most waivers have not changed, except the statute of limitations requirement.[193] However, important changes have happened for non-ENOs accidents. Before 1988, claims from non-ENO accidents were filed as state law causes of action in state or federal courts.[194] However, "[a]fter the Amendments Act, no state cause of action based upon public liability exists. A claim growing out of any nuclear incident is compensable under the terms of the Amendments Act or it is not compensable at all."[195] As mentioned earlier, the federal courts can only derive decision rules from state law that are consistent with existing federal law.[196] The federal law should be explained broadly as the "entire federal statutory scheme on nuclear power." The Amendments Act is simply the last addition to the federal law of nuclear energy that has been evolving since 1946 when Congress enacted the "Atomic Energy Act."[197] The PAA waived some defenses of fault in case of ENO.[198] Some scholars deduced from it that the default situation of non-ENOs should allow the defense of not being at fault.[199] In other words, the PLA cause of action in case of non-ENO accidents should be a negligence case and a breach of a standard of care should be established.[200] In many cases, the courts imposed a standard of care based on federal regulations governing permissible doses.[201]

Nevertheless, there were some cases where compensation was awarded even though the nuclear operator was in compliance with federal regulatory standards.[202] In *Cook v. Rockwell International Corp.*, plaintiffs brought a nuisance and trespass action under Colorado law and sought compensatory and punitive damages.[203] The District of Colorado awarded damages even

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[192] 42 U.S.C. § 2014(z)(hh).
[193] Price-Anderson Amendments Act of 1988, Pub. L. No. 100-408, § 10, 102 Stat. 1066.
[194] *In re TMI*, 67 F.3d 1103, 1105 (3d Cir. 1995); Bohrmann v. Maine Yankee Atomic Power Co., 926 F. Supp. 211, 216–17 (D. Me. 1996).
[195] Jose & Garza, *supra* note 189, at 16.
[196] 42 U.S.C. § 2014.
[197] O'Connor v. Commonwealth Edison Co., 13 F.3d 1090, 1095 (7th Cir. 1994).
[198] *Id.* at 1097.
[199] Jose & Garza, *supra* note 189, at 18.
[200] *Id.*
[201] *Id.* at 16–17.
[202] *Id.* at 18–19.
[203] Cook v. Rockwell Int'l Corp., 273 F. Supp. 2d 1175, 1178 (D. Colo. 2003).

when the exposed dose remained far below the regulatory requirement.[204] Following *Cook*, the Western District of Washington applied strict liability in a non-ENO accident in *In re Hanford Nuclear Reserving Litigation*.[205] Those judgments were criticized by Jose and Garza for applying a wrong cause of action.[206] Though *Cook* was not overruled, other counts have disagreed with its application. For example, in *Koller v. Pinnacle West Capital Corp.*, the court held that *Cook* failed to consider the preemption of a state law standard of care in light of the newly introduced federal PLA.[207] It further concluded that "the standard of care in a negligence claim . . . asserted under the Price-Anderson Amendments Act, must be analyzed in the context of the federal regulatory safety standards."[208] Applying strict liability for non-ENO cases is regarded as inconsistent with the Price-Anderson Act.[209] Many courts have also declined to follow *In re Hanford*.[210] Therefore, whether strict liability is applicable to non-ENO accidents, and whether breaching federal regulatory standards is necessary to determine a reasonable care standard, remains unsettled.

As discussed earlier, substantive rules deciding nuclear liability cases can still deviate from state law as long as they are consistent with the PAA. Whether the Act of God defense plays a role in deciding nuclear liability has not been discussed in case law. As discussed in Part III, there are many other negligence and strict liability cases where the Act of God defense can be made. In other words, the Act of God defense may apply in both negligence and strict liability cases. The difference lies in the content of the applicable tests, the "sole cause" element, and the foreseeability of the risk and impact.

D. Summary

The Fukushima accident showed that a serious nuclear incident can be triggered by a natural disaster. That triggers the question of whether such

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[204] *Id.* at 1180.

[205] *In re* Hanford Nuclear Reservation Litig., 350 F. Supp. 2d 871, 887–88 (E.D. Wash. 2004).

[206] Jose & Garza, *supra* note 189, at 19–20.

[207] Koller v. Pinnacle West Capital Corp., No. CV-06-2031-PHX-FJM, 2004 WL 446357, at *3 (D. Ariz. Feb. 6, 2007).

[208] *Id.*

[209] *Id.*

[210] For example, in *O'Connor v. Boeing North American, Inc.*, the court analyzed *Cook* and *In re Hanford* and held that strict liability is inconsistent with the PAA and should not apply non-ENO cases. O'Connor v. Boeing North American, Inc., CV-98-7383-DT, 2005 WL 6035255, at *43 (C.D. Cal. Aug. 18, 2005).

natural disasters should limit or bar the liability of the nuclear operator. Interestingly, this question was, as we showed, already heavily debated during the meeting preceding the drafting of the Vienna Convention in the spring of 1963.[211] In the original version of the international convention, an exoneration for damage caused via a grave natural disaster of an exceptional character was introduced, with the option for signatory states to abolish this exoneration.[212] However, following the Chernobyl incident in 1986, the nuclear conventions were revised, and as a result of which the exoneration for natural disasters of an exceptional character was no longer available.[213] However, as we will show below, this exoneration still exists in the nuclear liability law of Japan, even though Japan is not a member to any of the international nuclear liability conventions. When we look at the Act of God defense in U.S. law, the picture is more complicated. The PAA waived several defences of fault if the harm arose from an ENO, but the Act of God is not among the waivers.[214] Hence, applying Act of God defenses in case of ENO is still possible. For harm from non-ENO accidents, the substantive rules of state law can still apply.[215] Whether the Act of God defense is applicable in case of nuclear incidents has not been discussed in case law. The discussion in Part III shows that the Act of God defense is often allowed if the requirements of graveness, unforeseeability, and the Act of God being the sole cause are satisfied.

Some reasons for rejecting nuclear disasters as grounds for exoneration of nuclear liability, as presented during the diplomatic debates in 1963, are economic.[216] One argument is that the nuclear operator should be held liable when the damage caused by a natural disaster is foreseeable. The risk of natural disasters such as flooding or earthquakes should be important in determining the location of the nuclear operator as well as in decisions concerning the optimal design. Exposing nuclear operators to liability, even when the nuclear incident was triggered by a natural disaster is therefore certainly in line with the economic principles we have sketched above in Part II. Liability in this particular case can still positively affect the operators'

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[211] IAEA Records, *supra* note 130, at 247.

[212] *See supra* note 136.

[213] Protocol to the Paris Convention, *supra* note 142, art. IX; Protocol to the Vienna Convention, *supra* note 140, art. IV(3).

[214] 42 U.S.C. § 2210 (2006).

[215] Silkwood v. Kerr-McGee Corp., 485 F. Supp. 566, 572 (W.D. Okla. 1979).

[216] *See supra* note 123.

decision making process and therefore make sense from an economic perspective.

V. CASES

The extent to which a natural disaster creates a following incident beyond the operator's scope of control will often depend upon the factual situation. Therefore, we will now present two more detailed case studies. One is the Fukushima case in Japan. We start, however, with an Indonesian case which shows the difficulties in determining the man-made or natural character of a disaster and the blurring boundaries between those two categories.

A. Lapindo Mudflow Case: A Critical Perspective

The mudflow occurred on May 29, 2006, when a mix of hot steam, water, and mud erupted in the middle of a rice field in Sidoarjo, East Java, Indonesia.[217] This eruption occurred around 150 meters from an oil-drilling well, operated under a joint venture between two Indonesian oil companies, Lapindo Brantas and Medco, and an Australian company named Santos.[218] Currently, more than 130,000 cubic meters of hot mud erupts each day, creating a mudflow that inundates village after village forcing thousands to leave the area.[219] Even seven years later, the mudflow has no sign of ceasing, and the number of victims keeps growing.[220]

Lapindo, the largest shareholder of the drilling operation, is accused of triggering the mudflow, and Lapindo denies the relationship between the mudflow and its drilling operation.[221] However, a report from the Indonesian

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[217] David Cyranoski, *Muddy Waters: How Did a Mud Volcano Come to Destroy an Indonesia Town?*, 445 NATURE 812, 812 (2007).

[218] Lapindo owned the largest number of shares of the operation (50%), followed by Medco (32%) and Santos (18%). BADAN PEMERIKSA KEUANGAN, LAPORAN PEMERIKSAAN PENANGANAN SEMBURAN LUMPUR SIDOARJO 11–13 (2007).

[219] Cyranoski, *supra* note 217.

[220] *See* Jim Schiller, Anton Lucas & Priyambudi Sulistiyanto, *Learning from the East Java Mudflow: Disasters Politics in Indonesia*, 85 INDONESIA 51, 51 (2008).

[221] Lapindo has maintained that the mudflow was caused by the Yogyakarta earthquake occurred a few days before the first eruption. *See, e.g.*, Indra Darmawan & Rohman Taufiq, *Bertarung dengan Lumpur*, KORAN TEMPO, June 17, 2006, http://koran.tempo.co/konten/2006/06/17/73996/Bertarung-dengan-Lumpur. Similarly, Lapindo's spokewoman argued that the mudflow was a natural disaster named a natural mud volcano, that could possibly be triggerred by a seismic activity. *See* Raymond Bonner & Muktita Suhartono, *New Indonesia*

Supreme Audit Board showed several anomalies in the drilling operation, like the inappropriateness of Lapindo's drilling operation location,[222] the government's lack of proper inspection to the drilling operation,[223] and the inexperience of the operator.[224]

Lapindo's drilling operation was intended to search for gas reserves located at the Kujung limestone formation at a depth of around 10,000 feet. On March 8, 2006 Lapindo started to drill its BJP-1 drill well, and on May 27, 2006 the drilling operation reached 9,297 feet. On the same day, an earthquake of a magnitude of 6.3 on the Richter Scale hit Yogyakarta, which is around 280 kilometers southwest from Sidoarjo.[225] It was reported that at 9,297 feet the drilling underwent total loss circulation, forcing the operator to pull out the drill pipe and bit. It was during the process of pulling out the drill pipe that on May 28, 2006, the phenomenon known as "kick" (an influx of pore fluid into the well bore) occurred at 4,241 feet, causing the drill to get stuck.[226] The following day, a stream of volcanic mud started to erupt at around 150 meters away from the drill-well. Because the mudflow inundated the drilling area, the operator decided to abandon the well temporarily on June 4, 2006, and permanently on August 1, 2006.[227]

From such a series of events, an important question arises about the possible cause of the mudflow. The Supreme Audit Board observed three different possible scenarios. The first one is that the mudflow was triggered by the underground blowout, where fluids from two different zones influx into the surface. The report shows that this view was also initially shared by Lapindo.[228] The second scenario is that the mudflow stems from a mud

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Calamity: A Man-Made Mud Bath, N.Y. TIMES, Oct. 6, 2006, http://www.nytimes.com/2006/10/06/world/asia/06mud.html?pagewanted=all&_r=0.

[222] KEUANGAN, *supra* note 218, at 29. In addition, the report also criticizes the fact that the drilling took place in a highly populated area. As observed by the Board's report, the location of the driling operation was only five meters away from a residential area, and less than 100 meters away from public facilities. *Id.* at 27–28.

[223] Lapindo never submitted its daily drilling report to the BP Migas, a state agency that regulated and controlled oil and gas mining in Indonesia, and the agency never imposed a sanction on the company for its failure to report its drilling operation. *Id.* at 50–51.

[224] The report shows that Lapindo has contracted a drilling company named PT. Medici Citra Nusa (MCN) to conduct the drilling. According to the report, PT. MCN had conducted only one drilling operation before it was involved as Lapindo's contractor. *Id.* at 31–32.

[225] Cyranoski, *supra* note 217.

[226] *Id.*

[227] KEUANGAN, *supra* note 218, at 32.

[228] The Supreme Audit Board refers to a report from Lapindo on June 8, 2006 agreeing that the mudflow was caused by an underground blowout, where fluids from two different zones,

volcano that was triggered by Lapindo's drilling activities. This scenario would place blame on Lapindo's drilling activities and Lapindo's negligence for not installing a steel casing for a part of the drill hole.[229] Under the third scenario, the mudflow is considered to have no relationship with the drilling operation, since it was caused by a mud volcano as a result of the Yogyakarta earthquake. If this were the case, the earthquake created a new underground fraction that enabled the mud to flow to the surface.[230]

Under the first and second scenarios, the mudflow to a large extent corresponds to Lapindo's drilling operation, while the third scenario rejects the connection between the drilling operation and the mudflow.[231] Furthermore, it could also be assumed that under the first and second scenarios, the mudflow would not have occurred without the drilling operation, while under the third scenario, the mudlow would have occurred even if the drilling operation did not exist.

The local residents have suffered most of the resulting losses including over 3.2 trillion IDR (U.S. $296 million) in lost property. Economic losses, in terms of property and income losses, were also incurred by private companies (around 377 billion IDR; U.S. $34.8 million), several state-owned companies (around 57 billion IDR; U.S. $5.27 million), and a local water company (around 171 million IDR; U.S. $15,800). In addition, efforts to stop and control the mudflow in 2007 cost almost 1.5 trillion IDR (approximately U.S. $138.8 million). Total losses and expenses had reached 5.1 trillion IDR (more than U.S. $560 million) in 2007.[232] These figures are very likely to increase as a report by the Badan Perencanaan Pembangunan Nasional (Bappenas), the National Development Planning Agency, projects that by the year 2015 the mudflow could affect an area of 580 square kilometers or 80% of Sidoarjo Regency, and result in total economic losses of 16.4 trillion IDR (more than U.S. $1.8 billion).[233]

Since the begining of the eruption, Lapindo and its drilling operation have been accused of causing the mudflow.[234] Accordingly, the company was

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the overpressure zone and the Kujung formation, influxed into the surface through the existing fault. *See id.* at 33.

[229] *Id.* at 34.

[230] *Id.* at 35.

[231] *Id.* at 64–65.

[232] *Id.* at 274–77.

[233] Padjar Iswara et al., *Janji Baru Pemilik Lapindo*, TEMPO, Dec. 8, 2008, at 100.

[234] For example, one could refer to the opinion of Amin Widodo, a geologist from Surabaya Institute of Technology, in an interview with *Tempo* magazine. The scholar noted Lapindo's negligence in causing the mudflow. *See* Untung Widyanto et al., *Alarm Bells*, TEMPO ENGLISH,

asked to compensate for the damage resulting from the mudflow. Understandably, Lapindo has dismissed the accusation, and consequently claimed that any payment to the victims is only part of the company's social solidarity, not a legal duty.[235] Lapindo also insists that the payment for the victims take place under the framework of sale and purchase of property title, not under any compensation scheme. Thus, it seems any compensation will imply that Lapindo is liable for causing the mudflow.[236]

The mudflow has placed the Indonesian Government in a predicament. Politically, the President is under pressure from victims and NGOs on one side, and from Lapindo on the other side.[237] The Government tries both to help the victims of the mudflow and to avoid harming Lapindo.[238]

1. Court Ruling on the Mudflow Disaster

In 2007, a lawsuit was brought by Walhi, an Indonesian environmental NGO, against the Indonesian Government and drilling companies, including Lapindo. In this case, the plaintiff sought to hold defendants liable for environmental damage resulting from the Sidoarjo Mudflow. The plaintiff asked the defendants to stop the mudflow, as well as recover and rehabilitate the affected areas.[239] This section will discuss not only the ruling of *Walhi v.*

Aug. 22, 2006, http://magz.tempo.co/konten/2006/08/22/LU/13412/Alarm-Bells/51/06 (last visited on Mar. 13, 2015).

[235] KEUANGAN, *supra* note 218, at 192.

[236] In 2007 and 2008, Lapindo published several advertorials for several days in major national newspapers. The advertorials basically argued that the mudflow was caused by a natural phenomenon, i.e., the mud volcano created by the Yogyakarta earthquake. For discussions about these advertorials, see Wenseslaus Manggut et al., *Aneka Cara Menyemir Lapindo*, TEMPO, Feb. 30, 2008.

[237] In this regard, it is important to note that Aburizal Bakrie, who is one of the richest men in Indonesia and served as the Coordinating Minister of Social Welfare when the first mud eruption took place, owns the majority of Lapindo shares. He is the current Chairman of the Golkar Party, Indonesia's second largest party that forms a coalition with the President's Democratic Party and some other parties. *See* Raymond Bonner & Muktita Suhartono, *New Indonesia Calamity: A Man-Made Mud Bath*, N.Y. TIMES, Oct. 6, 2006, http://www.nytimes.com/2006/10/06/world/asia/06mud.html?pagewanted=all&_r=0; Simon Montlake, *Volcano Reveals A Murky Indonesia*, FAR E. ECON. REV., Jan/Feb 2008, at 19; *see also Java's Unstoppable Mudflow: Slimy Business*, ECONOMIST, Nov. 29, 2007, at 58, *available at* http://www.economist.com/node/10225951.

[238] Dani Muhtada, *Ethics, Economics and Environmental Complexity: The Mud Flow Disaster in East Java*, 25 SYS. RES. & BEHAV. SCI. 181, 186 (2008).

[239] Walhi v. Lapindo Brantas, Inc., 284/Pdt.G/2007/PN.Jak.Sel 21 (South Jakarta D. Ct. 2007).

Lapindo, but will also analyze and criticize the ruling by comparing the doctrines of strict liability and the Act of God defense discussed in previous sections.

a. Introduction to Walhi v. Lapindo

In *Walhi v. Lapindo*, the plaintiff claimed that the mudflow resulted from negligence of the drilling companies. According to the plaintiff, the drilling companies' negligence can be seen in the form of the failures to implement good practices in the drilling operation, to notice the sensitivity of the drilling location, and to take precautionary measures although the drilling operation was conducted in a highly populated area.[240] In addition, the plaintiff argued that the drilling activity was not supported by an environmental impact assessment (EIA). In the plaintiff's view, as a consequence of the absence of the EIA document, there was no proper anticipation of possible adverse impacts according to good engineering practices.[241] Furthermore, the plaintiff claimed that the drilling operation was conducted without installment of a drill pipe casing. According to the plaintiff, the absence of the drill pipe casing constituted a violation of a duty of care according to the good practices in drilling operation.[242] The plaintiff also asked that the drilling companies be held liable on the ground of strict liability. Strict liability refers to Article 35 of the 1997 EMA, while the negligence rule refers to Article 34 of the EMA.[243]

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[240] *Id.* at 10.

[241] *Id.*

[242] *Id.* at 126.

[243] Act of the Republic of Indonesia No. 23 of 1997 regarding Environmental Management has been repealed by Law No. 32/2009 on Environmental Protection and Management. An English copy can be found at http://faolex.fao.org/cgi-bin/faolex.exe?database=faolex&search_type=query&table=result&query=LEX-FAOC013056&format_name=@ERALL&lang=eng ("Article 34 (1) Every action which infringes the law in the form of environmental pollution and/or damage which gives rise to adverse impacts on other people or the environment, obliges the party responsible for the business and/or activity concerned to pay compensation and/or to carry out certain actions. Article 35 (1) The party responsible for a business and/or activity which gives rise to a large impact on the environment, which uses hazardous and toxic materials and/or produces hazardous and toxic waste, is strictly liable for losses which are given rise to, with the obligation to pay compensation directly and immediately upon the occurrence of environmental pollution and/or damage."); Walhi v. Lapindo Brantas, Inc., 383/Pdt/2008/PT.DK 8 (Jakarta Ct. App. 2008). It is unclear why the plaintiff used the two liability rules simultaneously. Indeed, the way the plaintiff mixed the negligence rule with strict liability has made its claim unnecessarily obscure. For instance, although the plaintiff has used both the negligence rule and strict liability, the evidence and arguments provided by

In response to these charges, Lapindo stated that strict liability could not be applied in the case since the drilling operation it carried out did not use hazardous substances or produce hazardous wastes.[244] Lapindo's argument relied on Article 35 part one of the 1997 EMA which states that strict liability is applicable to activities using hazardous substances, producing hazardous wastes, and/or giving rise to major or significant impacts on the environment.[245] One may certainly argue that the drilling operation could result in major or significant impacts on the environment, and hence, meet the requirements set forth in the 1997 EMA. However, in Lapindo's point of view, for strict liability to be applicable, the requirements above should be interpreted cumulatively such that the plaintiff should prove that Lapindo's drilling activity has, at the same time, used hazardous substances, produced hazardous wastes, and caused serious damage to the environment.

Furthermore, Lapindo also denied it has carried out an unlawful act. In this context, Lapindo argued that the absence of the EIA document does not constitute an unlawful act since the drilling activity, which was still in the exploration stage, was not an activity that requires the EIA documents.[246] In addition, Lapindo challenged the claim of unlawfulness by indicating that the drilling activity has met all requirements, permits, and procedures.[247] Through its expert witnesses, Lapindo argued that the absence of drill pipe casing does not prove the company's fault negligence.[248] Importantly, Lapindo's expert witnesses argued that the mudflow occurred as a result of a tectonic earthquake that hit Yogyakarta, around 300 km from the drilling site, two days prior to the first mud eruption.[249]

The District Court of South Jakarta ruled in favor of the defendants on the ground that the mudflow was caused by a natural phenomenon, i.e., the Yogyakarta earthquake. Hence, all defendants were acquitted from liability. The court further held that the government and Lapindo have a moral

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the plaintiff only attempted to show the defendants' negligence. It becomes even more ambiguous when one looks at the statements of claim in which the plaintiff, despite the use of strict liability, still asks the court to hold that the defendants have conducted an unlawful act resulting in environmental damage in three districts in Sidoarjo. *Id.* at 21.

[244] Walhi v. Lapindo Brantas, Inc., 383/Pdt/2008/PT.DK 47 (Jakarta Ct. App. 2008).

[245] *See generally id.*

[246] *Id.* at 45–46. Indeed, the exploration of oil and gas is excluded from the list of activities that require an EIA according to the Regulation of the Minister of the Environment No. 11 of 2006.

[247] *Id.* at 36.

[248] *Id.* at 195.

[249] *Id.* at 48, 153–63, 195.

obligation to take measures to restore the damage, stop the mudflow, and address social problems resulting from the mudflow. However, the court implicitly took the position that the government and Lapindo had met their moral obligations. In fact, the court considered the government's and Lapindo's efforts to handle the mudflow to be sufficient.[250]

The plaintiffs then brought the case to the Jakarta Court of Appeals, which upheld the lower court's decision.[251] The case did not advance past the Court of Appeals because the plaintiffs failed to submit the case to the Supreme Court.

The District Court of South Jakarta was of the opinion that both the government and Lapindo have sufficiently addressed the mudflow and its resulting damage. The court's position might, to a large extent, be affected by the court's view that the mudflow is the result of a natural disaster. It is in this context that the court's decision on *Walhi v. Lapindo* merits further discussions.

b. Court's Ruling: Earthquake Triggered the Mudflow

Before reaching its conclusion, the court posed a question of "apakah keluarnya semburan lumpur panas tersebut disebabkan oleh kesalahan Tergugat I dalam pengeboran atau disebabkan oleh fenomena alam" [translation: whether the mudflow was caused by the First Defendant's, i.e., Lapindo, negligence in conducting its drilling operation or by a natural phenomenon].[252] To answer this question, the Court then turned to testimonies of expert witnesses provided by both the plaintiff and defendants.

The only technical expert witness provided by the plaintiff stated that the mudflow was largely caused by the missing drill pipe casing. The witness also argued that drill pipe casing is an obligation for every drilling operation. The casing functions as a safety precaution to prevent an accident during the operation. Because the casing was not installed when the drilling reached 9,270 feet in depth, the drilling well could not sustain the high pressure as a "kick" occurred. This series of events eventually led to the explosion of hot

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[250] *Id.* at 197. It is not quite clear what the court means by moral obligations. The court did not explain why the government and Lapindo should bear similar moral obligations. Nor did the court explain why measures already taken by the government and Lapindo already are sufficient to meet such obligations.

[251] *See generally* Walhi v. Lapindo Brantas, Inc., 383/Pdt/2008/PT.DK 29–30 (Jakarta Ct. App. 2008).

[252] Walhi v. Lapindo Brantas, Inc., 284/Pdt.G/2007/PN.Jak.Sel 193.

muddy water causing the mudflow.[253] The witness also argued the fact that the muddy water has erupted a few hundred meters from the drilling well can be explained by combining two factors. On one hand, the drilling well was blocked by drilling equipment. On the other hand, there was an area of the drilling well where the casing was not installed. In the witness's view, the combination of these two factors led to the mud eruption, because the blocking of the drilling well has forced the water to find a way up through the area where the drill casing was absent, finally reaching the surface and bursting a few hundred meters from the well.[254]

However, this opinion was challenged by the defendant's four technical expert witnesses. The first expert argued that the area where the drilling took place was prone to mud volcanoes. The expert also stated that the occurring mud volcano has nothing to do with human activities, it is solely related to a natural event. Hence, the expert witness also argued that the mudflow cannot be stopped.[255] The second expert argued that the mudflow was triggered by ground motions as an extension of the Yogyakarta earthquake.[256] The third expert agreed that the mudflow was caused by a mud volcano triggered by ground motions, which did not correspond to Lapindo's drilling operation.[257] The fourth expert stated that according to characteristics of the muddy water, the water comes from an area much deeper than the depth that the drilling had reached. Hence, he argued that the drilling was not the cause of the mudflow. The fourth expert also testified that an uninstalled drill casing was a common practice, and hence, was not a mistake. There were drilling wells in other regions that had no such a casing installed without experiencing similar problems, despite the fact that those wells were much deeper than the well in question.[258]

The experts provided by the defendant agreed that the mudflow was the result of a mud volcano, formed by ground motions that were triggered by the Yogyakarta earthquake taking place two days before the first mud eruption. This conclusion was exactly the same as that held by the court.[259] The court also argued that the opinion of one expert provided by the plaintiff has been ruled out by the opinions of the four defense expert witnesses. The

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[253] *Id.* at 125–26.
[254] *Id.* at 126.
[255] *Id.* at 155.
[256] *Id.* at 157.
[257] *Id.* at 158.
[258] *Id.* at 160–61.
[259] *Id.* at 196.

court concluded that the mudflow was caused by a natural phenomenon, and not by the defendants' negligence.[260]

2. Critical Notes on the Court's Ruling in Walhi v. Lapindo

As explained earlier, the court in *Walhi v. Lapindo* asked whether the mudflow was caused by a natural phenomenon or by the fault of the defendant in conducting its drilling operation. In concluding that the mudflow was caused by a natural phenomenon, the court did not actually focus on whether there was any negligence on the part of the defendants. Therefore, the court's conclusion is vulnerable to criticism.

First, the court seems to have mishandled the question of strict liability, failing to consider whether strict liability was applicable to the case. Second, in failing to consider whether the defendant had any fault, it seems that the court decided that whenever there is an Act of God, the question of the defendants' fault is no longer relevant. This is unacceptable because there is no basis to release the defendants from liability without considering their contribution to the incurred losses.

The court also moved too fast in concluding that the mudflow was caused by the Yogyakarta earthquake. Reading the court's consideration, one might get a strong impression that one of the reasons supporting its conclusion is the fact that there was only one expert witness who attributed the mudflow to the way in which Lapindo conducted its drilling operation, as compared to four expert witnesses arguing that the mudflow was caused by a natural phenomenon, i.e., the ground motions triggered by the Yogyakarta earthquake.[261] Therefore, it seems that the conclusion was supported by the majority of scientists. However, this is not the case. Contrary to the court's conclusion, a majority of the world's leading geologists, during a 2008 meeting in Cape Town, agreed on a shared belief that the mudflow was more likely to have been triggered by Lapindo's drilling than by the Yogyakarta earthquake.[262]

Furthermore, it is important to compare the ruling in the *Walhi v Lapindo* with some insights from the discussion on United States court rulings concerning the Act of God defense. As explained earlier, U.S. courts usually

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[260] *Id.*

[261] *See id.*

[262] *Oil Company Blamed for Mud-Volcano Eruption*, 456 NATURE 14 (Nov. 6, 2008), *available at* http://www.nature.com/news/2008/081105/full/4560146.html; *see also Did Drilling Cause Eruption?*, NEW SCIENTIST, Nov. 8, 2008, at 6.

employ several criteria when examining the Act of God defense. Had the Indonesian court asked for evidence similar to that required by the U.S. courts, the result of the *Walhi v. Lapindo* case might have been significantly different.

The discussions below show how the U.S. court requirements for the Act of God defense would be applied to the *Walhi v. Lapindo*. In particular, the discussions below attempt to answer whether the Yogyakarta earthquake, as an event triggering the mud volcano that eventually leads to the Sidoarjo mudflow, was: first, grave in character; second, unforeseeable, unanticipated, and unpreventable; and third, the sole proximate cause, free from human negligence or intervention.

In deciding whether the Act of God defense invoked by Lapindo is valid, a court should first evaluate whether the Yogyakarta earthquake was a grave natural disaster for the location of the Sidoarjo mudflow, as it occurred 300 kilometers away from Yogyakarta. Such a question means that one needs to look into the magnitude of the earthquake, felt in the location of the mudflow, in order to conclude if the earthquake was strong enough to trigger the mudflow. In this context, one commentator states that the Yogyakarta earthquake was in fact too small and too far away to trigger a mud volcano. Specifically, based on data on earthquakes in the region, previous earthquakes have been observed that were larger and much closer to the location of the mudflow than the Yogyakarta earthquake. However, those earthquakes did not trigger a mudflow.[263] From this point of view, it might be concluded the Yogyakarta could not have triggered a mud volcano in Sidoarjo region as massive as the currently occurring mudflow.

However, one might argue that the distance from the epicenter of the Yogyakarta earthquake and the location of the mudflow should not be an issue, because, according to a leading scientist, an earthquake is still able to trigger a mud volcano in a location thousands of kilometers away.[264] In this regard, what matters is whether the Yogyakarta earthquake created a seismic energy that was capable of reactivating the already over-pressurized

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[263] Michael Manga, *Did an Earthquake Trigger the May 2006 Eruption of the Lusi Mud Volcano?*, 88 EOS 201 (2007); *see also* Richard J. Davies et al., *The East Java Mud Volcano (2006 to Present): An Earthquake or Drilling Trigger?*, 272 EARTH & PLANETARY SCI. LETTERS 627, 629–30 (2008); Michael Manga, Maria Brumm & Maxwell L. Rudolph, *Earthquake Triggering of Mud Volcanoes*, 26 MARINE & PETROLEUM GEOLOGY 1785, 1788 (2009).

[264] A. Mazzini, *Triggering and Dynamic Evolution of the LUSI Mud Volcano, Indonesia*, 261 EARTH & PLANETARY SCI. LETTERS 375, 387 (2007).

underground fractures in the pre-existing fault zone underneath the location of the mudflow eruption, triggering the hot, muddy water eruption. Hence, the issue is not about distance, but about the impacts of energy created by a seismic activity.

To respond to this argument, one indeed needs to actually investigate and predict how great the energy created by the Yogyakarta earthquake was, such that it could trigger ground motions at the location of the mudflow eruption. In this regard, researchers have investigated static and dynamic stress changes caused by other earthquakes, by the Yogyakarta earthquake, and by the drilling work at the site of the mudflow eruption.[265] The researchers observe that changes in pore pressure, due to changes in static and dynamic stresses caused by the earthquake, were negligible to lead to a mud volcano. In fact, tens of previous earthquakes, which had significantly larger ground motions than the Yogyakarta earthquake, did not yield enough stress to cause a mud volcano in the location of the present mudflow.[266] A less technical interpretation of these findings is that the dynamic stress changes created by the Yogyakarta earthquake are similar to the stress changes generated from the force of an adult footstep, whereas the static stress changes are even 500 times smaller. In comparison, Lapindo's nearby drilling generated drill-pipe pressures able to cause stress changes similar to the pressure generated by about ten to twenty elephants.[267] Thus, the drilling is more likely than the earthquake to cause the mudflow. Consequently, it could be argued that, felt at the mudflow location, the Yogyakarta earthquake was too small to be considered a grave natural disaster.

Assume that all scientific opinions above were flawed. Accordingly, the Yogyakarta earthquake could still be considered as capable of triggering a mud volcano. If this was the case, Lapindo still has the burden to prove that the mudflow, as a form of mud volcano, was unforeseeable, and the impacts of it was unpreventable. In this regard, the next question that should have

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[265] According to the authors, earthquakes can expand or contract the Earth's crust permanently. These permanent stress changes, referred to as static stress changes, could cause an increase in pore pressure and lead to underground fractures. On the other hand, seismic waves generated by earthquakes create temporary stress, referred to as dynamic stress changes, changes as the waves pass through the crust. Dynamic stresses, if sufficiently large and repeated, can lead to an increase in pore pressure, eventually leading to liquefaction and sediment flow as the conditions of a mud volcano formation. *See* Davies et al., *supra* note 263, at 630–31. It could be argued that the larger the stress changes are, the more likely a mud volcano is to occur.

[266] *Id.* at 635.

[267] Debi Kilb, *Volcanology: Throwing Mud*, 1 NATURE GEOSCIENCE 572, 573 (2008).

been addressed by the court is whether the mudflow, as a form of mud volcano, should have been foreseen and anticipated.

Davies et al. consider that the Sidoarjo mudflow originated from an undersurface blowout.[268] This opinion is challenged by Sawolo et al., who argue that even two months after the eruption the drilling bit was still in the original position, suggesting that the muddy water has never flown up the well,[269] and more importantly, the drilling well and the casing shoe remained intact after the mudflow eruption, indicating that there is no connection between the drilling and the mudflow.[270] In responding to this challenge, Davies et al. argue the facts that the well was still intact and the drill bit was still in its original position do not indicate that the blowout did not occur. According to Davies et al., the re-entry of the well does not indicate that the well remained intact. In addition, they also argue that the drill bit can remain in its original position particularly in zones of highly swelling clays and if the large volumes of cement have been pumped into the wells, such as in the Lapindo's drilling well case. Hence, according to Davies et al., the facts submitted by Sawolo et al., do not prove that the mudflow was not caused by an undersurface blowout.[271]

Davies et al.'s argument above will inevitably give rise to a serious legal consequence because if the mudflow was indeed caused by blowouts, then the Act of God defense will automatically be rejected. This is because a blowout is considered a common phenomenon in drilling practices, which leads to the responsibility of those engaged in the drilling operation to foresee and anticipate. This is very clearly stated in *Green v. General Petroleum*, in which the court rejected a defense arguing blowouts amounted to an Act of God. There, the court held that since it is common knowledge that "the inner earth contains powerful gaseous forces, frequently found in proximity to and in connection with deposits of petroleum substances."[272] For this reason, the court contended that the blowouts did not constitute an Act of God.[273]

Moreover, the fact that the area where Lapindo's drilling operation is located is prone to mud volcanism is admitted not only by the camp

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[268] Davies et al., *supra* note 263, at 637.

[269] *See* Nurrochmat Sawolo et al., *The LUSI Mud Volcano Controversy: Was it Caused by Drilling?*, 26 MARINE & PETROLEUM GEOLOGY 1766 (2009).

[270] *Id.* at 1651.

[271] Davies et al., *supra* note 263; Sawolo et al., *supra* note 269.

[272] Green v. General Petroleum Corp., 270 P. 952, 953–54 (Cal. 1928).

[273] *Id.* at 954.

attributing the mudflow to Lapindo's drilling,[274] but also by those who argue that the Sidoarjo mudflow is an earthquake-triggered mud volcano. Sawolo et al., clearly state that the Sidoarjo mudflow "is a new mud volcano in a *region prone to mud volcanism.* Along the vicinity of the Watukosek fault, where LUSI is situated, *there are at least five other known mud volcanoes.*"[275] Similarly, even during the court hearing, an expert witness submitted by Lapindo argued that mud volcano is a common phenomenon in Sidoarjo region.[276]

The fact that mud volcanism is a common and known phenomenon in the Lapindo's drilling site should have had an impact on the court's ruling. Because the drilling was carried out in a location prone to mud volcanism, the possibility of a mud volcano should have been foreseen and anticipated. In this context, the court should have investigated whether the design and operation of Lapindo's drilling activities had foreseen and anticipated the possibility of mud volcanism. The court should also have considered whether Lapindo had taken appropriate measures to mitigate the occurring mud volcano. Unfortunately, these two legal consequences were overlooked in the court's ruling. Lessons from the U.S. courts show that common and known natural events, regardless of the magnitude, impose obligations on parties who carry out an activity to foresee and anticipate the events, and to take preventive measures accordingly. Failure to foresee, anticipate, and prevent harm resulting from such common events means that the parties are negligent and leads to the rejection of the Act of God defense.

However, if the court found that the mud volcano and the earthquake were unforeseeable, Lapindo still actually has the burden to prove that the mudflow was solely caused by the Yogyakarta earthquake. In this regard, the last question that needs to be answered is whether the mudflow occurred independently of human intervention, either in the forms of negligence or human act, or in simpler words, whether the mudflow would still have occurred even if Lapindo did not conduct its drilling operation.

As discussed earlier, the court in *Walhi v. Lapindo* overlooked the question of whether there was human intervention in the case.[277] The court seems to be of the opinion that the presence of an Act of God could rule out

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[274] *See, e.g.*, Davies et al., *supra* note 263, at 1656.

[275] Sawolo et al., *supra* note 269, at 1780 (emphasis added).

[276] Walhi v. Lapindo Brantas, Inc., 284/Pdt.G/2007/PN.Jak.Sel 38.

[277] This is because the court only focused on the question of whether the earthquake has triggered the mudflow, and failed to consider the possible contribution of Lapindo's drilling operation. *Id.* at 193–96.

any man-made contributions. Let us now examine the question of whether there was human intervention in the mudflow case, either in the forms of Lapindo's negligence (in the case of the negligence rule) or Lapindo's drilling operation (in the case of strict liability).

One common reason to show Lapindo's fault is the fact that there was an area of open hole, where the drill casing was not installed into the well. Rubiandini argues that the installment of drill casing is part of the standard operating procedure within the drilling practice. He compares the casing with the helmet for a motor rider, where both function as a safety procedure to reduce risks.[278]

Another factor that might cause the mudflow is the way the drilling operators have dealt with the blowout phenomenon. In this regard, Bachtiar, as quoted by Cyranoski, stated that one of the possible causes of the mudflow was that the drill was removed too quickly when the blowout was happening, such that the pressure inside the well becomes uncontrollable.[279] To some extent, Davies et al. agree with this opinion. They argue that the absence of the casing was only a contributing factor for the mud volcano. The main factor triggering the formation of mud volcano is the removal of the drill bit and drill pipe on May 27, 2006, the days when the "kicks" were occurring and where the hole was extremely unstable, which then caused an influx of formation fluid and gas into the wellbore.[280]

In addition to these factors, Davies et al., also indicate two other critical errors in the way the drilling was operated. Their errors are overestimating the ability of the well to sustain pressure and the failure to identify the "kick" more rapidly.[281] Certainly, one could also add to these errors the possibility that Lapindo has failed to foresee, anticipate, and take necessary preventive measures against a common and known phenomenon of mud volcanism. All of these factors should eventually lead to the conclusion that some negligence on the side of the defendant was present in the mudflow case.

Even if one agrees with Mazzini et al.'s opinion that it is impossible to determine the cause of the mudflow with certainty, one cannot, however, entirely dismiss the presence of negligence in the drilling operation. Consequently, if the court applied the U.S. court's criterion that the Act of

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[278] Rudi Rubiandini, *Interviu: Mereka Sudah Keterlaluan*, VI(18) TRUST 56, 57 (2008). It seems also that initially Davies thought that the absence of casing was a primary trigger of the mudflow. *See* Davies et al., *supra* note 263, at 629.

[279] Cyranoski, *supra* note 217, at 814.

[280] Davies et al., *supra* note 263, at 637.

[281] Sawolo et al., *supra* note 269.

God should be free from the defendant's negligence, the court would have rejected the Act of God defense submitted by Lapindo.

Let us now consider whether the mudflow would still have occurred even in the absence of Lapindo's drilling. One way to answer this question is to compare the impacts of the Yogyakarta earthquake and Lapindo's drilling on the location of the mudflow eruption. Recalling, Davies et al. comparison mentioned earlier, it is clear that compared to the earthquake, the drilling has created much larger and more powerful stress changes capable of increasing pore pressure, which could eventually lead to the eruption. Again, the studies of Manga and also Davies et al., show that previously tens and even hundreds of earthquakes that were much larger and closer than the Yogyakarta earthquake did not cause a mud volcano at the same location.[282]

Hence, if one considers that the conclusion solely attributing the mudflow to the drilling is inconclusive, one cannot nevertheless completely rule out the possibility that the drilling might have impacts on the mudflow. In this regard, even Mazzini, a leading scientist arguing that the mudflow was triggered by the Yogyakarta earthquake, still admits the possibility that the drilling might have contributed to the mudflow.[283]

These facts give rise to two possible consequences to the rulings of *Walhi v. Lapindo*. First, the court should have rejected the Act of God defense on the ground that it is impossible to rule out the possibility of the drilling's contribution to the mudflow, and hence, it cannot be proven that the Yogyakarta earthquake was the sole cause of the mudflow. Second, the court could have found that there was a possibility of comingling between the earthquake and the drilling, and could have held Lapindo liable for all incurred losses due to its failure to make an apportionment regarding the contribution of the earthquake and Lapindo's contributing acts to the incurred losses.

In addition, if the court consistently applied strict liability in *Walhi v. Lapindo*, the court should have actually asked Lapindo to prove that the occurring mudflow does not fall within the risk of conducting a drilling operation, particularly in a mud volcano-prone area. Alternatively, Lapindo should have actually been asked to show the impossibility of the mudflow resulting from the conducted drilling operation.

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[282] *See generally* Manga, *supra* note 263; Davies et al., *supra* note 263.

[283] Dennis Normille, *Two Years On, a Mud Volcano Still Rages and Bewilders*, 320 SCIENCE 1406 (2008).

None of these issues were addressed by the court, leaving one with no other option than to conclude that the ruling on *Walhi v. Lapindo* is not only weak, but also inconsistent with the doctrines of strict liability and the Act of God defense.

B. Fukushima: Act of God?

1. The Factual Background

A 9.0 magnitude earthquake shook the east coast of Japan on March 11, 2011, which was followed by a destructive tsunami. This disaster lead to catastrophic losses: it was reported that by the end of 2011 15,457 persons died, 5,349 persons were injured, 7,676 persons were missing, and over 125,000 buildings were damaged or destroyed as a consequence of the tsunami.[284] Moreover, the tsunami led to a second catastrophe in Japan, the core melt down in the Fukushima I Nuclear Power Plant, which is located near the east coast. The power plant is designed by General Electric (GE) and maintained by the Tokyo Electric Power Company (TEPCO). Before the earthquake, three of the six reactors in the Fukushima I Nuclear Power Plant had been shut down for maintenance. Shortly after the earthquake, the other three reactors were shut down automatically. However, even after the shutting down of the nuclear reactors, a cooling system still had to be in operation to absorb the decay heat from the radioactive decay of the unstable isotopes.[285] Cooling pumps can be either powered by on site units or offsite units, such as grid and diesel generators. In the case of the Fukushima I Power Plant, all the emergency electricity generators were located in the basement of the Turbine Building at the moment of the earthquake. The seawall of the power plant was designed to protect the plant from a 5.7 meter flood. However, unfortunately, a 13 meter maximum height tsunami

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[284] *See* JAPANESE NATIONAL POLICE AGENCY, DAMAGE SITUATION AND POLICE COUNTERMEASURES ASSOCIATED WITH 2011 TOHOKU DISTRICT – OFF THE PACIFIC OCEAN EARTHQUAKE, *available at* http://www.npa.go.jp/archive/keibi/biki/higaijokyo_e.pdf (last visited Oct. 13, 2014); JAPANESE NATIONAL POLICE AGENCY, 平成2年(2011年)東北地方太平洋沖地震の被害状況と警察措置 [THE DAMAGE OF TŌHOKU EARTHQUAKE OF 2011], *available at* http://www.npa.go.jp/archive/keibi/biki/higaijokyo.pdf (last visited Oct. 13, 2014).

[285] *See* Jay Friess & Andy Marso, *What If It Happened Here? Evacuation Zones Outlined in Case of Emergency at Calvert Cliffs*, SOMDNEWS, http://www.somdnews.com/stories/03232011/rectop133917_32384.shtml (last visited Oct. 13, 2014).

followed the earthquake and arrived at Fukushima.[286] This led to flooding in the turbining building, including the power units, and further causing the failure of the cooling system. This was followed by a series of accidents, including full meltdown in three reactors, hydrogen explosions and leaking of cooling water.[287] This serious accident was later rated as International Nuclear Event Scale 7, parallel with only the Chernobyl Accident in the history of nuclear industry.[288]

This nuclear accident is a typical example that is caused by a combination of natural disaster and human contribution. It is directly triggered by the tsunami following the catastrophic earthquake. However, a careful examination shows that human factors are involved as well. For example, the design of placing emergency electricity generators in the basement of the turbine building makes them very vulnerable to flooding risk. It was reported that the designer, GE, was aware of such risk since 1970s.[289] However, both GE and TEPCO did nothing to reduce such risk since then. Moreover, there is even criticism claiming TEPCO choose to locate their power plant in such a vulnerable place on purpose to externalize the potential costs created by an accident.[290] Under this situation, the question arises whether a natural disaster can be used as a defense to exonerate the nuclear operator from liability. This question can only be answered after an examination of the nuclear liability legislation in Japan.

2. Legal Framework of Nuclear Liability in Japan

Japan is a country relying heavily on nuclear energy: it is reported that the generating capacity of nuclear power plants composed approximately 20% of

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[286] Pillip Lipsy et al., *The Fukushima Disaster and Japan's Nuclear Plant Vulnerability in Comparative Perspective*, ENVTL. SCI. & TECH. 6083 (2013), *available at* http://www.stanford.edu/~plipscy/LipscyKushidaIncertiEST2013.pdf (last visited Oct. 13, 2014).

[287] *See Japan 'Unprepared' for Fukushima Nuclear Disaster*, BBC NEWS (June 7, 2011), http://www.bbc.co.uk/news/mobile/worldasiapacific13678627.

[288] The IAEA introduced International Nuclear Event Scale (INES) system in 1990 to classify the significance of nuclear and radiological events. According to INES, events are divided into seven levels, with ten times difference in severity between each adjacent scale levels. *See Factsheets & FAQs*, INTERNATIONAL ATOMIC ENERGY AGENCY, http://www.iaea.org/Publications/Factsheets/English/ines.pdf (last visited Oct. 13, 2014).

[289] Norihiko Shirouzu & Chester Dawson, *Design Flaw Fueled Nuclear Disaster*, WALL ST. J., http://online.wsj.com/article/SB10001424052702304887904576395580035481822.html.

[290] *See* J. Mark Ramseyer, *Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan*, 13 THEORETICAL INQUIRIES IN L. 457 (2012).

the total power generation capacity of Japan as of 2009.[291] However, Japan is not a party to any of the above mentioned nuclear liability conventions. This might be because Japan has no land-border with other countries with nuclear power. Hence, Japan's need to handle cross-border damage is not as marked as e.g., in Europe. Besides, other nearby Asian countries with nuclear power, such as China and South Korea did not join the international conventions either.[292] Four instruments largely compose the Japanese nuclear liability legislation: the Act on Compensation for Nuclear Damage (Act on Compensation), the Order for the Execution of the Act on Compensation for Nuclear Damage (Order on Compensation), the Act on Indemnity Agreement for Compensation of Nuclear Damage (Act on Indemnity) and the Order for the Execution of the Act on Indemnity Agreement for Compensation of Nuclear Damage (Order on Indemnity).[293] This section briefly sketches the principles under the legislation.

Japanese nuclear liability legislation has a few similar characteristics as those of the international conventions. For example, a channeled strict liability and compulsory financial security are also adopted in the Japanese system. Section 3 of the Act on Compensation is titled "Liability without fault, channeling of liability" and reads:

> Where nuclear damage is caused as a result of reactor operation etc. during such operation, the nuclear operator who is engaged in the reactor operation etc. on this occasion shall be liable for the damage, except in the case where the damage is caused by a grave natural disaster of an exceptional character or by an insurrection.[294]

This section holds the nuclear operator liable for damage, and fault is not a requirement to establish liability. The channeling of liability is further

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[291] *See* JAPAN NUCLEAR ENERGY SAFETY ORG., CURRENT STATUS OF NUCLEAR FACILITIES IN JAPAN 1 (2010), http://www.atom-library.jnes.go.jp/unkan/e-unkanhp1/e-unkanhp1-2010/book1/ (last visited Jan. 10, 2014).

[292] Toyohiro Nomura et al., *Japan's Nuclear Liability System*, *in* OECD/NEA, JAPAN'S COMPENSATION SYSTEM FOR NUCLEAR DAMAGE: AS RELATED TO THE TEPCO FUKUSHIMA DAIICHI NUCLEAR ACCIDENT 27, 27 (2012). See on nuclear liability in China Liu Jing and Michael Faure, *Compensating Nuclear Damage in China*, 11(4) WASH. U. GLOBAL STUD. L. REV. 781 (2012).

[293] Copies of English translation can be found at the website of NEA, *see* http://www.oecd-nea.org/law/legislation/japan.html (last visited Jan. 10, 2014).

[294] Act on Compensation, Section 3.

clarified in Section 4, which requires no other person other than the nuclear operator to be liable.[295] Section 3 also stipulates the exonerations available for nuclear operators: the damage caused by a grave natural disaster of an exceptional character or by a serious social disturbance. This is in line with the first generation of international nuclear liability conventions. The terms used in the conventions are "act of armed conflict, hostility, civil war or insurrection." There is no significant difference between these words and the term "serious social disturbance."[296] In the second generation of international conventions, a grave natural disaster of an exceptional character is precluded from the exonerations. However, this is still an available defense in Japan.

The Japanese nuclear liability system is different from the international system, with one difference being uncapped liability in Japan, as opposed to capped liability in the international context.[297] Hence, the liable party in Japan has to pay the entire cost of danger it caused as long as it is solvent. In spite of the unlimited liability, there is a ceiling for the financial security required from nuclear operators. The Act on Compensation for Nuclear Damage requires different levels of financial security from different types of nuclear operators, varying from 4 billion yen (U.S. $40 million) to 120 billion yen (U.S. $1.15 billion).[298] The operators can choose to use different types of instruments to realize such financial obligation, such as liability insurance, an indemnity agreement with the government, or a deposit approved by the competent authority.[299]

Japanese nuclear operators, like their international counterparts, primarily use liability insurance to provide financial security. Considering the potential catastrophic nature of a nuclear accident, insurers often pool together to provide insurance coverage. In Japan, the Japan Atomic Energy Insurance Pool (JAEIP), which is comprised of forty-three insurance companies, provides nuclear liability insurance. However, it is worth noting

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[295] Act on Compensation, Section 4.

[296] *See* Hisashi Tanikawa, *The Amendment of the Law on Compensation for Nuclear Damage in Japan, in* REFORM OF CIVIL NUCLEAR LIABILITY: INTERNATIONAL SYMPOSIUM, BUDAPEST, HUNGARY, 31 MAY–3 JUNE 1999 (OECD/NEA), 533–34 (2000).

[297] Julius Weitzdörfer, 'Die Haftung für Nuklearschäden nach japanischem Atomrecht – Rechtsprobleme der Reaktorkatastrofe von Fukushima I', *Zeitschrift für Japanisches Recht* 31 J. JAPANESE L. 61, 70–71 (2011) [*Liability for Nuclear Damages pursuant to Japanese Atomic Law – Legal Problems Arising from the Fukushima I Nuclear Accident*].

[298] *Act on Compensation for Nuclear Damage, supra* note 293, § 7; *Order for the Execution of the Act on Compensation for Nuclear Damage, supra* note 293, § 2.

[299] *Act on Compensation for Nuclear Damage, supra* note 293, § 7.

that certain types of risks are excluded from insurance coverage, including the damage caused by a grave natural disaster of an exceptional character or by a serious social disturbance.[300]

The indemnity agreements provide nuclear operators with an opportunity to provide financial security, when a certain risk is excluded by insurance and other instruments. The market is reluctant to provide coverage for such risks, like nuclear damage caused by natural disasters, damage happening ten years after the accident and damage caused by normal operation since they are regarded as unpredictable.[301] As discussed earlier, only when a grave natural disaster is classified as "of an exceptional character" can it be used to exonerate the operator from liability. For damage caused by other natural disasters, the operator is still liable. In this case, he can cover the risk through an indemnity agreement. The operator has to pay an indemnity fee as the price of coverage. The Cabinet Order shall decide the indemnity rate according to the probability of damage and the government expenditures.[302] The rate of indemnity is set as 3/10,000 or 1.5/10,000, depending on types of facilities before the Fukushima accident. The government has the authority to increase the rate if the amount available for indemnifying nuclear damage under an indemnity agreement is insufficient to cover the amount laid down by said agreement at the time of payment.[303]

A nuclear accident could be catastrophic, leading to losses well above the required financial security and the operator's own assets. In such a case, many victims may be left undercompensated or even uncompensated. In response to such situations, the enacted Act on Compensation gives the government discretion to provide aid to operators.[304] This Act also requires the government to take measures to relieve victims and to prevent further damage.[305]

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[300] Liability insurance for nuclear installations, common clause, 2000 (Clause 2000), Article 7. As cited in Oba Hirokazu, Nuclear Damage and Liability Insurance for Nuclear Damage, 51 OTIA U. ECON. REV. 21, 33–34 (2000 (in Japanese) (大羽宏一, 原子力災害と原子力損害賠償責任保険, 大分大学経済論集51(6), 21–47 (2000)).

[301] *Act on Indemnity Agreements for Compensation of Nuclear Damage*, *supra* note 293, § 2.

[302] *Id.* § 6.

[303] *Order for the Execution of the Act on Indemnity Agreements for Compensation of Nuclear Damage*, *supra* note 293, § 3.

[304] *Act on Indemnity Agreements for Compensation of Nuclear Damage*, *supra* note 293, § 16.

[305] *Act on Compensation for Nuclear Damage*, *supra* note 293, § 17.

3. Compensation for the Fukushima Accident in Practice

Regarding compensation for the Fukushima accident, the first question that needs to be answered is whether the earthquake and tsunami can be used as an exoneration to prevent the establishment of liability. Although the 9.0 magnitude earthquake is very significant and led to catastrophic losses, the government was reluctant to admit that the disaster was "of an exceptional character" and held TEPCO fully responsible for the damage it caused. This is because the east coast of Japan is very vulnerable to earthquakes. Hence, a significant earthquake is not unpredictable in such areas. Furthermore, some argued that experts had warned that an earthquake might lead to a nuclear accident at the Fukushima power plant, and TEPCO should have been aware of such a risk.[306]

A Dispute Reconciliation Committee for Nuclear Damage Compensation was established shortly after the accident to ascertain the scope of the damage and to promote compensation.[307] The Committee published several guidelines on the scope of compensable damage,[308] which broadly includes personal damage, property damage, and even some pure economic losses.[309] In addition to these types of individual damages, the Fukushima accident led to environmental damage. To promote the decontamination from the environmental damage, the Act on Special Measures concerning the Handling of Environmental Pollution by Radioactive Materials Discharged by NPS Associated with the Tohoku District-Off the Pacific Ocean Earthquake that Occurred on March 11, 2011 (Act on Measures for

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[306] *See* Weitzdörfer, *supra* note 297, at 76–77.

[307] The Act on Compensation for Nuclear Damage allows the establishment of such a Committee; the Committee shall be "in charge of mediating reconciliation of any dispute arising from compensation of nuclear damage and of preparing general instructions to help operators reach a voluntary settlement of such disputes." *See Act on Compensation for Nuclear Damage*, *supra* note 293, § 18.

[308] For the content of guidance in Japanese, see http://www.mext.go.jp/a_menu/genshi_baisho/jiko_baisho/index.htm (last visited Jan. 10, 2014).

An English translation of these guidelines can be found at: OECD/NEA, Japan's Compensation System for Nuclear Damage, As Related to the TEPCO Fukushiam Daiichi Nuclear Accident, 89–184 (2012), *available at* http://www.oecd-nea.org/law/fukushima/7089-fukushima-compensation-system-pp.pdf.

[309] For example, the guidance allows compensation for business damage, damage due to rumors and indirect damage. Physical damage is not required to award compensation. *Id.*

Environmental Pollution) was adopted.[310] The Act requires the national government, local government, and TEPCO to work together to decontaminate the polluted environment and dispose of nuclear waste.[311]

As discussed earlier, nuclear damage caused by natural disaster is not covered by liability insurance. The government provides indemnification up to 120 billion yen. After the accident, the insurance pool JAEIP refused to renew the insurance contract in 2012 and continues to refuse, because the Fukushima I power plant has not been restored to normal status and has been categorized as creating consistent risks. After the government paid for indemnification, the indemnity rate relating to nuclear reactors with thermal outputting exceeding 10,000 was increased from 3/10,000 to 20/10,000.[312] Though the exact amount for the total losses caused by the Fukushima accident is currently unknown, it is estimated to be much higher than 120 billion yen (U.S. $1.15 billion). The Organization for Economic Co-operation and Development's Nuclear Energy Agency estimates that the first-year compensation amount was 1.25 trillion yen (U.S. $10 billion) and the compensation for the second year and beyond was 897.2 billion yen per year.[313] Compensating for the remaining losses is a challenge. Not surprisingly, the government chose to intervene in response to this catastrophe. Passed on August 3, 2011, the Act to Establish Nuclear Damage Compensation Facilitation Corporation created a specific organization and system of financing for compensation.[314] The Compensation Facilitation Corporation can provide compensatory support to operators in two forms: the ordinary financial assistance approved by the management committee of the Corporation and the special financial assistance approved by the competent minister. A special business plan would have to be formulated in the latter case. Under such a plan, the Corporation can get support from government

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[310] Act on Measures for Environmental Pollution, http://www.mext.go.jp/b_menu/shingi/chousa/kaihatu/016/shiryo/__icsFiles/afieldfile/2011/09/21/1311103_13_2.pdf (last visited Jan. 10, 2014).

[311] Act on Measures for Environmental Pollution, arts. 43–45.

[312] Nomura et al., *supra* note 292, at 20.

[313] JAPAN'S COMPENSATION SYSTEM FOR NUCLEAR DAMAGE, *supra* note 292, at 59.

[314] *Japan's parliament approves Tepco compensation plan*, BBC (Aug. 3, 2011), http://www.bbc.co.uk/news/business-14383832; *Outline of the bill of the Act to Establish Nuclear Damage Compensation Facilitation Corporation (tentative)*, MINISTRY OF ECONOMY, TRADE AND INDUSTRY, http://www.meti.go.jp/english/earthquake/nuclear/roadmap/pdf/20110614_damage_corporation_2.pdf (last visited Jan. 10, 2014); *Outline of the bill of the Act to Establish Nuclear Damage Compensation Facilitation Corporation*, MINISTRY OF ECONOMY, TRADE AND INDUSTRY (June 20, 2011), http://www.meti.go.jp/english/earthquake/nuclear/roadmap/pdf/20110614_damage_corporation_1.pdf.

bonds or from financial institutions with the guarantee of the government. Then, the Corporation can provide monetary support to the nuclear operator for compensation, which needs to be paid back in the following years by the supported operator in the form of special contributions. The other nuclear power plant operators must to pay general contributions as well. Hence, a mutual support system is established under the Act.[315]

VI. CONCLUDING REMARKS

The starting point for this Article was the question of whether the ancient paradigm that there can be no liability for an Act of God still holds. The recent March 2011 Fukushima incident in Japan, along with many other technological disasters, show that there are, in fact, blurring boundaries between natural and man-made disasters. A natural phenomenon—like a flood, earthquake or tsunami—turns into a disaster due to the intervention of men.

The question we addressed in this Article: to what extent should a natural disaster be considered an Act of God such that an operator is completely excluded from liability when the subsequent technological accident takes place. Using a simple economic model, we explained that this is, in fact, a case of two contributing causes: a man-made cause (failure to intervene) and a natural cause. Economic logic dictates that if the damage would not have occurred but for the human intervention, the operator should be held liable for the damage. Only when the operator merely partially contributed to the loss (such as his failure to take adequate preventive measures) can there be proportional liability (like in the case of causal uncertainty). Still, there would be very few reasons to argue in favor of total exclusion of liability, even if the incident was caused by a natural disaster.

The original nuclear liability conventions were relatively lenient toward the operator, providing for exoneration if the nuclear accident was caused by a grave natural disaster of an exceptional character. However, the legislation of the contracting party could provide to the contrary. After the Chernobyl disaster, the second generation nuclear conventions excluded this exoneration. Moreover, nuclear liability law in Japan, where this exoneration still exists, requires a critical assessment as to whether the grave

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[315] *Outline of the bill of the Act to Establish Nuclear Damage Compensation Facilitation Corporation (tentative)*, *supra* note 314; *Outline of the bill of the Act to Establish Nuclear Damage Compensation Facilitation Corporation (tentative)*, *supra* note 314.

natural disaster was of an exceptional character. The Japanese government rightly held that an earthquake, even a serious one, can hardly be considered a grave natural disaster of an exceptional character, excluding liability of the operator.

The economic logic of exposing operators to liability, even if a technological accident was trigged by a natural disaster, is obvious: ex ante knowledge of liability exposure efficiently incentivizes operators to consider grave natural hazards and accordingly choose appropriate care, appropriate activity levels, proper location, and proper design. The experience with the Fukushima incident shows that this may be quite important.

Thus, there will be relatively little room for excluding the liability of operators in the case of a natural disaster, which is also consistent with U.S. case law. Only when the natural disaster is grave, unforeseeable, and unprecedented and human intervention could not have prevented the loss may there be exoneration from liability. However, with increasing technological possibilities, it will be even harder for operators to argue that a natural hazard was the sole cause of the loss. Of course, as the Indonesian Lapindo Mudflow case shows, there may be uncertainty as to whether a natural disaster (like an earthquake) or man-made action (such as the drilling operation) caused the damage. However, the Lapindo case illustrates the crucial importance of correctly allocating the burden of proof regarding casual uncertainty, which is consistent with U.S. case law, by forcing the operator to show that he took all measures to prevent the damage from occurring, notwithstanding the natural hazard. Moreover, the presence of causal uncertainty is not a reason to rule out liability of the operator altogether; at best, liability ought to be proportional to the extent that the operator's activity contributed to the loss.

However, the histories of the Indonesian court case and the nuclear liability conventions show that when high financial interests are at stake, industry lobbying affecting court adjudication and formulation of liability rules is a constant risk. Even if the international nuclear liability conventions exclude the "grave natural hazard of an exceptional character" standard, the construction of the liability regime in the international content is still far from efficient. Features such as exclusive channeling of liability to the operator, low limits in liability, and public funding awarding a large subsidy to the nuclear industry are clearly not in line with the economic principles of efficient accident law, and can only be explained as the results of efficient lobbying by the particular industry involved.